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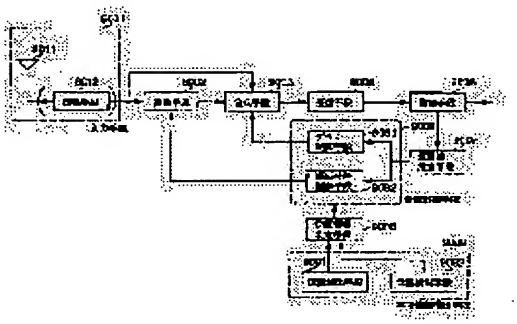
(54) DIGITAL TELEVISION BROADCAST RECEIVER

(57)Abstract:
PROBLEM TO BE SOLVED: To accurately eliminate a receiving failure due to delay to improve reception quality by bending linear conductive material, making it have directivity by utilizing conductive material base plate and synthesizing estimated delay quantity with an input signal when demodulated.
SOLUTION: Bent linear conductive material is arranged parallelly and adjacently to a conductive material base plate such as the body of a car, and an installation area is and directivity gain is also improved by grounding one end part of a power feeder terminal to the base plate to form an antenna. An inputting means 9001 of a receiver converts an inputted radio wave into an electric signal, a synthesizing means 9003 synthesizes it with a signal delayed by prescribed time, and a receiving means 9004 and a demodulating means 9005 demodulate it according to prescribed processing. In such a case, a synthetic controlling means 9006 controls a delaying means 9002 and the means 9003 based on a delay wave estimated by a delay wave estimating means 9007 from demodulation information based on a pilot signal of a received wave. It also finds delay information from position and speed information of a vehicle information detecting means 9009 and controls synthetic gain and time of a delay signal.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] a line with at least one or more flections or bends -- a conductor to the electric supply section with the input means which is one or antenna equipment whose two or more exist A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 2] a line with at least one or more flections or bends -- a conductor to the electric supply section with the input means which is one or antenna equipment whose two or more exist A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 3] A flection or a bend is claim 1 characterized by being four or more places [even], or a digital television broadcast receiving set given in two.
[Claim 4] the line of a spiral configuration -- a conductor to the electric supply section with the input means which is one or antenna equipment whose two or more exist A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 5] the line of a spiral configuration -- a conductor to the electric supply section with the

input means which is one or antenna equipment whose two or more exist A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 6] a line -- a conductor -- said electric supply section -- receiving -- two -- existing -- the two lines -- a conductor is crooked -- it curves -- it is -- it is -- claims 1, 2, 3, and 4 to which the winding direction which forms a spiral is characterized by being the direction same in view of said electric supply section mutually, or a digital television broadcast receiving set given in five.
[Claim 7] a line -- a conductor -- said electric supply section -- receiving -- two -- existing -- the two lines -- a conductor is crooked -- it curves -- it is -- it is -- claims 1, 2, 3, and 4 characterized by the winding direction which forms a spiral being a direction which is mutually different, in view of said electric supply section, or a digital television broadcast receiving set given in five.
[Claim 8] the die length from the electric supply section to the 1st folding point or a curving point is relatively longer than the die length from said 1st folding point or a curving point to the 2nd folding point or a curving point -- it is -- it is -- the digital television broadcast receiving set according to claim 1 or 2 characterized by the short thing.
[Claim 9] The digital television broadcast receiving set characterized by being arranged near the conductor cope plate and connecting the grounding terminal and said conductor cope plate of an antenna.
[Claim 10] The input means which is antenna equipment with which it is arranged near the conductor cope plate, and the switching element is prepared between the grounding terminal of an antenna, and said conductor cope plate, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 11] The input means which is antenna equipment with which it is arranged near the conductor cope plate, and the switching element is prepared between the grounding terminal of an antenna, and said conductor cope plate, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 12] The digital television broadcast receiving set according to claim 9, 10, or 11

characterized by supplying electric power from the opposite side in which the electric supply terminal of an antenna penetrates said conductor cope plate, and said antenna is installed.
[Claim 13] The digital television broadcast receiving set according to claim 10 or 11 characterized by obtaining desired directivity or plane of polarization using a switching element by performing connection change-over control with the grounding terminal of said antenna, and said conductor cope plate.
[Claim 14] The digital television broadcast receiving set according to claim 10 or 11 characterized by the plane of polarization which acquires the maximum effectiveness by turning on a switching element serving as a horizontally polarized wave.
[Claim 15] The digital television broadcast receiving set according to claim 10 or 11 characterized by the plane of polarization which acquires the maximum effectiveness by turning off a switching element serving as a vertically polarized wave.
[Claim 16] A connection change-over of a switching element is a digital television broadcast receiving set according to claim 10 to 15 characterized by the ability to carry out remote control.
[Claim 17] The digital television broadcast receiving set according to claim 9 to 12 characterized by controlling the property of said antenna in a necessary property by changing the distance of an antenna and said conductor cope plate.
[Claim 18] The digital television broadcast receiving set according to claim 9 to 12 characterized by controlling the property of said antenna in a desired property by changing the include angle of an antenna flat surface and said conductor cope plate flat surface to make.
[Claim 19] It is the digital television broadcast receiving set according to claim 9 to 18 which a spacer is inserted between an antenna and said conductor cope plate, and is characterized by the spacer consisting of low dielectric constant ingredients.
[Claim 20] The digital television broadcast receiving set according to claim 9 to 19 with which a conductor cope plate is characterized by being a part of mobile, some buildings, some structures, or some wireless use equipments.
[Claim 21] The input means which is antenna equipment with which the antenna consists of antenna element groups which simplified two or more antenna elements in the single electric supply section, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means. The digital television broadcast receiving set characterized by things.
[Claim 22] The input means which is antenna equipment with which the antenna consists of antenna element groups which simplified two or more antenna elements in the single electric supply section, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 23] The digital television broadcast receiving set according to claim 21 or 22 characterized

by forming a tap in the predetermined location of two or more antenna elements, doubling them, and constituting said single electric supply section.
[Claim 24] Two or more antenna elements are digital television broadcast receiving sets according to claim 21, 22, or 23 characterized by tuning frequency being the same and obtaining predetermined antenna efficiency.
[Claim 25] Two or more antenna elements are claims 21 and 22 which are the antennas corresponding to two or more division bands which divided the target frequency band, respectively, and are characterized by request band-ization being realized by said those antenna element groups, or a digital television broadcast receiving set given in 23.
[Claim 26] The tuning frequency of each antenna element is a digital television broadcast receiving set according to claim 25 characterized by being set up with predetermined spacing.
[Claim 27] The frequency band to cover is a digital television broadcast receiving set according to claim 21, 22, or 23 characterized by being set to a **** [tuning frequency / in the case of being single of each antenna element], or the bottom.
[Claim 28] The digital television broadcast receiving set according to claim 21, 22, or 23 characterized by adjusting the width of face of the band which sets up the number of antenna elements to connect by carrying out setting control at a predetermined number.
[Claim 29] The arrangement condition of each antenna element makes any one antenna flat surface a base plane top among said two or more antenna elements. [whether in the base plane, it approaches or concentrates and each antenna is arranged, and] Or [whether it is arranged in the perpendicular direction to said base plane so that each antenna flat surface may become stratified, and] or the direction where each antenna flat surface is perpendicular -- and it shifts horizontally and is arranged -- the digital television broadcast receiving set according to claim 21, 22, or 23 characterized by being that either.
[Claim 30] The digital television broadcast receiving set according to claim 21, 22, or 23 with which what has long antenna element length is relatively characterized by the short thing being relatively set as high tuning frequency by low tuning frequency.
[Claim 31] The digital television broadcast receiving set according to claim 21, 22, or 23 with which what has long antenna element length is relatively characterized by arranging the thing short on the outside inside relatively.
[Claim 32] The digital television broadcast receiving set according to claim 21, 22, or 23 characterized by using the balanced unbalance transducer for the electric supply section of an antenna.
[Claim 33] The digital television broadcast receiving set according to claim 21, 22, or 23 characterized by connecting the active element or the amplifier to the electric supply section of an antenna.
[Claim 34] The digital television broadcast receiving set according to claim 21, 22, or 23 characterized by carrying out contiguity arrangement of the coil which the impedance converter is used for the electric supply section of an antenna, or considers one side as a ground, and uses one side as an electric supply edge, or carrying out contiguity arrangement of the balance coil.
[Claim 35] The digital television broadcast receiving set according to claim 21, 22, or 23 characterized by using the isolator for the electric supply section of each antenna element.
[Claim 36] The digital television broadcast receiving set according to claim 23 characterized by setting the direction which takes a tap as arbitration for every antenna element.
[Claim 37] The digital television broadcast receiving set according to claim 23 characterized by communalizing the electrode from an electric supply terminal to the tap location of each antenna element.
[Claim 38] The digital television broadcast receiving set according to claim 37 characterized by arranging said communalized electrode in parallel with said antenna element.
[Claim 39] The digital television broadcast receiving set according to claim 23 characterized by

taking the tap of each antenna element through a reactive element or a variable reactive element.
[Claim 40] The digital television broadcast receiving set according to claim 39 characterized by acquiring a predetermined impedance, a predetermined band, predetermined directivity, or the maximum effectiveness by adjusting the reactance value of each antenna element.
[Claim 41] By setting up association of the part which the opening terminal side of an antenna element counters The input means which is antenna equipment by which tuning frequency is controlled, and a delay means to input the signal from said input means and to delay it, A synthetic means to compound the signal acquired from said delay means, and the signal acquired from said input means, A recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 42] By setting up association of the part which the opening terminal side of an antenna element counters The input means which is antenna equipment by which tuning frequency is controlled, and a receiving means to perform frequency conversion of the signal acquired from said input means, A recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 43] By setting up association with the part countered the neutral point or near the neutral point the opening terminal side of an antenna element The input means which is antenna equipment by which tuning frequency is controlled, and a delay means to input the signal from said input means and to delay it, A synthetic means to compound the signal acquired from said delay means, and the signal acquired from said input means, A recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means. The digital television broadcast receiving set characterized by things.
[Claim 44] By setting up association with the part countered the neutral point or near the neutral point the opening terminal side of an antenna element The input means which is antenna equipment by which tuning frequency is controlled, and a receiving means to perform frequency conversion of the signal acquired from said input means, A recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and

is acquired by said recovery control means.
[Claim 45] The digital television broadcast receiving set according to claim 41, 42, 43, or 44 characterized by performing a setup of association of the part which counters by preparing a predetermined distance in the meantime.
[Claim 46] The digital television broadcast receiving set according to claim 41, 42, 43, or 44 characterized by performing a setup of association of the part which counters by connecting a concentrated constant between them.
[Claim 47] A conductor is connected. the two poles of a coil -- respectively -- at least one or more lines -- the neutral point of a coil to a grounding terminal -- moreover -- each -- a line -- a tap being formed from the position of a conductor or a coil, and with the input means which is antenna equipment with which the electric supply terminal is taken out from there A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 48] A conductor is connected. the two poles of a coil -- respectively -- at least one or more lines -- the neutral point of a coil to a grounding terminal -- moreover -- each -- a line -- a tap being formed from the position of a conductor or a coil, and with the input means which is antenna equipment with which the electric supply terminal is taken out from there A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 49] at least one or more lines -- a conductor to the electric supply section through a coil with the input means which is one or antenna equipment formed two A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 50] at least one or more lines -- a conductor to the electric supply section through a coil with the input means which is one or antenna equipment formed two A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering

information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 51] Claims 1, 2-49 to which each antenna element is characterized by being formed by the printed circuit on the same substrate or a multilayer substrate, or a digital television broadcast receiving set given in either of 50.
[Claim 52] The digital television broadcast receiving set according to claim 1 to 51 characterized by performing control which chooses one or two antennas or more out of two or more antennas.
[Claim 53] The digital television broadcast receiving set according to claim 52 characterized by performing control which chooses the antenna of receiver input max in the control which chooses an antenna.
[Claim 54] The digital television broadcast receiving set according to claim 52 characterized by performing control which chooses the antenna of multi-pass interference level min in the control which chooses an antenna.
[Claim 55] The digital television broadcast receiving set according to claim 1 to 54 characterized by preparing an antenna element in the crevice of a conductor cope plate.
[Claim 56] The digital television broadcast receiving set according to claim 9 to 20 characterized by a conductor cope plate being a plate which prepared the shape of a mesh, and one or more through tubes.
[Claim 57] The main antenna elements by which the predetermined part was grounded, and one or more antenna elements by which contiguity arrangement is carried out at the main antenna element, it is relatively shorter than said main antenna elements, and both ends are not grounded, The input means which is antenna equipment equipped with one or more antenna elements by which contiguity arrangement is carried out at said main antenna elements, it is relatively longer than said main antenna elements, and both ends are not grounded, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 58] The main antenna elements by which the predetermined part was grounded, and one or more antenna elements by which contiguity arrangement is carried out at the main antenna element, it is relatively shorter than said main antenna elements, and both ends are not grounded, The input means which is antenna equipment equipped with one or more antenna elements by which contiguity arrangement is carried out at said main antenna elements, it is relatively longer than said main antenna elements, and both ends are not grounded, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and

is acquired by said recovery control means.
[Claim 59] The digital television broadcast receiving set according to claim 57 or 58 with which an antenna element is characterized by being a monopole type or a dipole type.
[Claim 60] Each antenna element is a digital television broadcast receiving set according to claim 57, 58, or 59 characterized by using the printed-circuit approach and being formed on a printed circuit board.
[Claim 61] The digital television broadcast receiving set according to claim 9 characterized by the magnitude of a conductor cope plate being the same on the magnitude of said antenna element side, and parenchyma, or being less than [it].
[Claim 62] The digital television broadcast receiving set according to claim 61 characterized by not connecting the conductor cope plate with other ground members near the conductor cope plate.
[Claim 63] The digital television broadcast receiving set according to claim 9 to 20 characterized by setting up the distance between a conductor cope plate and said antenna element 0.01 to 0.25 times (0.01-0.25lambda) to the wavelength lambda in the resonance frequency f of an antenna.
[Claim 64] It is the digital television broadcast receiving set according to claim 9 to 20 characterized by setting up the distance between said conductor cope plate and said each antenna element 0.01 to 0.25 times (0.01-0.25lambda) to the wavelength lambda in the resonance frequency f of each antenna for every antenna element when two or more arrangement of the antenna element is carried out.
[Claim 65] The digital television broadcast receiving set according to claim 9 to 20 characterized by arranging a high dielectric constant member between a conductor cope plate and said antenna element.
[Claim 66] Two or more antennas are digital television broadcast receiving sets according to claim 52 characterized by being installed in two or more parts of the car-body pillar section of an automobile, and the roof section, and considering as a diversity configuration with the antenna of these plurality.
[Claim 67] The digital television broadcast receiving set characterized by connecting the ground section to a conductor cope plate and its conductor cope plate, having the antenna element by which contiguity arrangement was carried out, and arranging the field of said conductor cope plate which counters said antenna element at least rather than said antenna element at the communications-partner side.
[Claim 68] A conductor cope plate is a digital television broadcast receiving set according to claim 67 characterized by surrounding the perimeter of said antenna element on parenchyma.
[Claim 69] The digital television broadcast receiving set according to claim 67 or 68 with which a conductor cope plate is characterized by being either [some] a mobile, a building, the structure and wireless use equipment.
[Claim 70] A conductor cope plate and the antenna element by which the ground section was connected to the conductor cope plate, and contiguity arrangement was carried out, The input means which is antenna equipment equipped with a rotation means to rotate said conductor cope plate and said antenna element with the arrangement condition, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.

[Claim 71] A conductor cope plate and the antenna element by which the ground section was connected to the conductor cope plate, and contiguity arrangement was carried out, The input means which is antenna equipment equipped with a rotation means to rotate said conductor cope plate and said antenna element with the arrangement condition, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 72] A conductor cope plate and the antenna element by which the ground section was connected to the conductor cope plate, and contiguity arrangement was carried out, The input means which is between said conductor cope plates and said antenna elements, and is antenna equipment equipped with the ferroelectric installed around said antenna element, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 73] A conductor cope plate and the antenna element by which the ground section was connected to the conductor cope plate, and contiguity arrangement was carried out, The input means which is between said conductor cope plates and said antenna elements, and is antenna equipment equipped with the ferroelectric installed around said antenna element, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 74] The digital television broadcast receiving set according to claim 72 or 73 characterized by a ferroelectric being movable.
[Claim 75] The input means which is antenna equipment with which the ground section is connected to a conductor cope plate and its conductor cope plate, it has the antenna element by which contiguity arrangement was carried out, and said antenna element is formed in the configuration doubled with the configuration of said conductor cope plate, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay

means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 76] The input means which is antenna equipment with which the ground section is connected to a conductor cope plate and its conductor cope plate, it has the antenna element by which contiguity arrangement was carried out, and said antenna element is formed in the configuration doubled with the configuration of said conductor cope plate, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 77] An antenna element is a digital television broadcast receiving set according to claim 75 or 76 characterized by being arranged inside said conductor cope plate.
[Claim 78] A conductor cope plate and two or more antenna elements from which the die length by which the ground section was connected to the conductor cope plate, and contiguity arrangement was carried out corresponding to the tuning frequency of two or more bands differs, An input means to transform into an electrical signal the electromagnetic wave which is antenna equipment about two or more electric supply sections prepared in each of two or more of the antenna elements, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 79] A conductor cope plate and two or more antenna elements from which the die length by which the ground section was connected to the conductor cope plate, and contiguity arrangement was carried out corresponding to the tuning frequency of two or more bands differs, The input means which is antenna equipment which has two or more electric supply sections prepared in each of two or more of the antenna elements, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 80] The ground section is connected to a conductor cope plate and its conductor cope plate, and it has the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which is the part which forms the perpendicular-on parenchyma wall of a vehicle, and is antenna equipment with which the electric field of the antenna element are formed

in real waterworks Taira, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.

[Claim 81] The ground section is connected to a conductor cope plate and its conductor cope plate, and it has the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which is the part which forms the perpendicular-on parenchyma wall of a vehicle, and is antenna equipment with which the electric field of the antenna element are formed in real waterworks Taira, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[Claim 82] The ground section is connected to a conductor cope plate and its conductor cope plate, and it has the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which is the part which forms the real waterworks flat wall of a vehicle, and is antenna equipment with which the electric field of the antenna element were formed in the parenchyma top perpendicular, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.

[Claim 83] The ground section is connected to a conductor cope plate and its conductor cope plate, and it has the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which is the part which forms the real waterworks flat wall of a vehicle, and is antenna equipment with which the electric field of the antenna element were formed in the parenchyma top perpendicular, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means

based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 84] The ground section is connected to a conductor cope plate and its conductor cope plate, and it has the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which are some housing walls of mobile equipment and is antenna equipment with which the antenna element is arranged at the interior side of said housing wall, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 85] The ground section is connected to a conductor cope plate and its conductor cope plate, and it has the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which are some housing walls of mobile equipment and is antenna equipment with which the antenna element is arranged at the interior side of said housing wall, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 86] It is the digital television broadcast receiving set characterized by equipping a conductor cope plate and its conductor cope plate with the antenna element by which contiguity arrangement was carried out, forming the predetermined part of said antenna element with the coil or the conductor of a zigzag configuration, and the end of said antenna element being grounded by said conductor cope plate.
[Claim 87] The digital television broadcast receiving set according to claim 86 which is the case where said coil or the conductor of a zigzag configuration is formed in the edge of said antenna element, and is characterized by connecting on the insulator in which said coil or the conductor of a zigzag configuration, and other parts of said antenna element were prepared on said conductor cope plate.
[Claim 88] It is the digital television broadcast receiving set characterized by having a conductor cope plate and two or more antenna elements from which the die length arranged by approaching the conductor cope plate differs, forming each predetermined part of said antenna element with the coil or the conductor of a zigzag configuration, and one edge each of said antenna element being grounded by said conductor cope plate in common.
[Claim 89] It is the digital television broadcast receiving set which is equipped with a conductor cope plate, two or more antenna elements from which the die length arranged by approaching the conductor cope plate differs, and the coil connected at the common node of one edge each of these antenna elements or the conductor of a zigzag configuration, and is characterized by the other end of said coil or the conductor of a zigzag configuration being grounded by said conductor cope plate.
[Claim 90] The digital television broadcast receiving set according to claim 89 characterized by connecting said coil or the conductor of a zigzag configuration, and other parts of said antenna

element on the insulator formed on said conductor cope plate.
[Claim 91] The digital television broadcast receiving set according to claim 87 or 91 characterized by dividing said coil or the conductor of a zigzag configuration into two, making connection of said two divided parts on the insulator formed on said conductor cope plate, and connecting the electric supply section to the connection further.
[Claim 92] The digital television broadcast receiving set characterized by having the antenna element which the whole was formed with the coil or the conductor of a zigzag configuration, and was formed in the configuration with at least one or more flections or bends.
[Claim 93] The digital television broadcast receiving set characterized by connecting the insulator top which the end was grounded by a conductor cope plate and its conductor cope plate, equipped them with the antenna element by which contiguity arrangement was carried out, and prepared the electric supply section on said conductor cope plate as a relay point.
[Claim 94] It is the digital television broadcast receiving set which an end is grounded by a conductor cope plate and its conductor cope plate, equips them with the antenna element by which contiguity arrangement was carried out, forms a through tube in said conductor cope plate, and is characterized by for said antenna element of the through tube forming an insulator on said conductor cope plate of the opposite side, and connecting the electric supply section on said insulator through said through tube.
[Claim 95] The digital television broadcast receiving set according to claim 94 characterized by forming one or more another insulators in the side which formed said insulator of said conductor cope plate, and connecting passive circuit elements to it on between the another insulator and said insulator.
[Claim 96] It is prepared at a conductor cope plate and its conductor cope plate between the antenna element by which contiguity arrangement was carried out, and its antenna element and said conductor cope plate. It grounds in a case. the conductor which has a through tube into a predetermined part -- a case -- having -- the end of said antenna element -- said conductor -- said conductor -- the digital television broadcast receiving set characterized by connecting the electric supply section to one on two or more insulators formed on said conductor cope plate within a case through said through tube, and connecting passive circuit elements on between said two or more insulators.
[Claim 97] The antenna element formed on the conductor cope plate, the insulator plate by which contiguity arrangement was carried out at the conductor cope plate, and said insulator plate of a side far from said conductor cope plate, It connects with the conductor which penetrates said insulator plate from the antenna element, and its conductor. It has the conductor formed in the opposite side with the field in which said antenna element of said insulator plate was formed. The end of said antenna element is a digital television broadcast receiving set characterized by being grounded by said conductor cope plate and connecting the electric supply section near said said grounded end of said conductor.
[Claim 98] a conductor with an area it is prepared on a conductor cope plate, the insulator plate formed on the conductor cope plate, and its insulator plate, and smaller than said conductor cope plate -- with a plate the conductor -- contiguity arrangement is carried out at a plate -- having -- said conductor -- with the input means which is antenna equipment which equipped the plate with the antenna element by which the end was grounded A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The

digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 99] a conductor with an area it is prepared on a conductor cope plate, the insulator plate formed on the conductor cope plate, and its insulator plate, and smaller than said conductor cope plate -- with a plate the conductor -- contiguity arrangement is carried out at a plate -- having -- said conductor -- with the input means which is antenna equipment which equipped the plate with the antenna element by which the end was grounded A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[Claim 100] said conductor -- the digital television broadcast receiving set according to claim 98 or 99 characterized by the area of a plate and the area of said antenna element being the same magnitude on parenchyma.
[Claim 101] The digital television broadcast receiving set according to claim 88 to 91 characterized by simplifying said two or more antenna elements in the single electric supply section.
[Claim 102] Said two or more antenna elements are digital television broadcast receiving sets according to claim 101 which are an antenna corresponding to two or more division bands which divided the target frequency band, respectively, and are characterized by request band-ization being realized by said those antenna element groups.
[Claim 103] The input means which is antenna equipment equipped with the conductor cope plate with which the electric conduction plate for antenna touch-down was formed in the predetermined part, and the antenna element by which it has been arranged near the conductor cope plate, and the end was connected to said electric conduction plate for antenna touch-down, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. The digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[Claim 104] The input means which is antenna equipment equipped with the conductor cope plate with which the electric conduction plate for antenna touch-down was formed in the predetermined part, and the antenna element by which it has been arranged near the conductor cope plate, and the end was connected to said electric conduction plate for antenna touch-down, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, The digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay

wave presumption means, and is acquired by said recovery control means.
[Claim 105] The digital television broadcast receiving set according to claim 103 or 104 characterized by arranging said conductor cope plate and said antenna element flat surface in a real Kamitaira line.
[Claim 106] Claims 103 and 104 characterized by the area of said conductor cope plate and the area of said antenna element flat surface being the same magnitude on parenchyma, or a digital television broadcast receiving set given in 105.
[Claim 107] It is the digital television broadcast receiving set according to claim 1 to 106 which is the case where it has two or more antenna elements, and is characterized by being installed so that it may have the maximum gain to the electric wave of the plane of polarization from which an antenna element differs, respectively.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] Especially this invention relates to the digital television broadcast receiving set which attached for example, used antenna equipments, such as AM broadcast, FM broadcasting, TV broadcast, and radiotelephony, for car bodies, such as an automobile.
[0002]
[Description of the Prior Art] With progress of car multimedia age, the data utility which various wireless devices, such as AM and not only FM radio but TV, radiotelephony, a navigation system, etc., are carried also in an automobile, and continues to be offered by the electric wave increases increasingly, and it is thought in recent years that the importance of an antenna increases increasingly.
[0003] When installing an antenna in an automobile etc. generally, the car body which consists of conductor cope plates affects the engine performance of antennas, such as directional gain. Conventionally, as an antenna used for an automobile, the monopole, the rod antenna, V dipole antenna, etc. are used in consideration of installing in a car body. That in which many of these antennas are made to project and it prepares the antenna element of the shape of a long rod to a car body is almost the case.
[0004] In order to improve the trouble of the conventional terrestrial analog television broadcasting, the terrestrial digital television broadcasting format was proposed on the other hand in recent years. In terrestrial digital television broadcast, the correspondence procedure using the carrier of a large number which are called an OFDM method and which intersect perpendicularly is introduced, and various cures with a multi-pass failure are performed. For example, the guard period called a guard interval is established between transmission symbols in order to prevent the intersymbol interference by the delay wave.
[0005]
[Problem(s) to be Solved by the Invention] However, as mentioned above, the antenna which the car body was made to project and has prepared the antenna element of the shape of a long rod generally used for the automobile has various problems, such as a cause of having spoiled the exterior fine sight and whizzing sound generating, and the danger of a theft, removal in the case of car washing.
[0006] Moreover, on the other hand in a terrestrial digital JON broadcasting format, radio disturbance, such as frequency complement system phasing by interference of the reflected wave by the building etc., occurs. Furthermore, in terrestrial digital television broadcast, in order to use a frequency band effectively, the method which transmits the same program on the same frequency from two or more transmitting stations called SFN is proposed. As a result of this SFN broadcasting format, between the signals transmitted from the contiguity station, a time delay surely exists, and as a result, a signal causes interference and also generates radio disturbance.

[0007] This invention is equipped with the antenna equipment which can be miniaturized so that it unites with the car body near [, such as an automobile,] the car body, and it can install on a flat surface and arrangement may be possible in consideration of the conventional antenna and the technical problem of digital broadcast also in a narrow location, and an improvement of the radio disturbance in migration reception of digital data is aimed at. A digital television broadcast receiving set is offered.
[0008]
[Means for Solving the Problem] the line in which this invention (claim 1 correspondence) has at least one or more flections or bends -- a conductor to the electric supply section with the input means which is one or antenna equipment whose two or more exist A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[0009] the line in which this invention (it corresponds to claim 2) has at least one or more flections or bends -- a conductor to the electric supply section with the input means which is one or antenna equipment whose two or more exist A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[0010] this invention (it corresponds to claim 4) -- the line of a spiral configuration -- a conductor to the electric supply section with the input means which is one or antenna equipment whose two or more exist A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[0011] this invention (it corresponds to claim 5) the line of a spiral configuration -- a conductor to the electric supply section with the input means which is one or antenna equipment whose two or more exist A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with

said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[0012] This invention (it corresponds to claim 9) is a digital television broadcast receiving set characterized by being arranged near the conductor cope plate and connecting the grounding terminal and said conductor cope plate of an antenna.

[0013] The input means which is antenna equipment with which this invention (it corresponds to claim 10) is arranged near the conductor cope plate, and the switching element is prepared between the grounding terminal of an antenna, and said conductor cope plate, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.

[0014] The input means which is antenna equipment with which this invention (it corresponds to claim 11) is arranged near the conductor cope plate, and the switching element is prepared between the grounding terminal of an antenna, and said conductor cope plate, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[0015] This invention (it corresponds to claim 21) is the antenna element group which simplified two or more antenna elements in the single electric supply section. The input means which is antenna equipment with which the antenna is constituted, and a delay means to input the signal from said input means and to delay it, A synthetic means to compound the signal acquired from said delay means, and the signal acquired from said input means, A recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means. It is the digital television broadcast receiving set characterized by things.

[0016] This invention (it corresponds to claim 22) is the antenna element group which simplified two or more antenna elements in the single electric supply section. The input means which is antenna equipment with which the antenna is constituted, and a receiving means to perform frequency conversion of the signal acquired from said input means, A recovery means to change the signal

from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[0017] This invention (it corresponds to claim 41) by setting up association of the part which the opening terminal side of an antenna element counters The input means which is antenna equipment by which tuning frequency is controlled, and a delay means to input the signal from said input means and to delay it, A synthetic means to compound the signal acquired from said delay means, and the signal acquired from said input means, A recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.

[0018] This invention (it corresponds to claim 42) by setting up association of the part which the opening terminal side of an antenna element counters The input means which is antenna equipment by which tuning frequency is controlled, and a receiving means to perform frequency conversion of the signal acquired from said input means, A recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[0019] This invention (it corresponds to claim 43) by setting up association with the part countered the neutral point or near the neutral point the opening terminal side of an antenna element The input means which is antenna equipment by which tuning frequency is controlled, and a delay means to input the signal from said input means and to delay it, A synthetic means to compound the signal acquired from said delay means, and the signal acquired from said input means, A recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means. It is the digital television broadcast receiving set characterized by things.

[0020] This invention (it corresponds to claim 44) by setting up association with the part countered the neutral point or near the neutral point the opening terminal side of an antenna element The input means which is antenna equipment by which tuning frequency is controlled, and a receiving means to perform frequency conversion of the signal acquired from said input means, A recovery means to change the signal from said receiving means into the signal of baseband, A delay wave

presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[0021] A conductor is connected. this invention (it corresponds to claim 47) -- the two poles of a coil -- respectively -- at least one or more lines -- the neutral point of a coil to a grounding terminal -- moreover -- each -- a line -- a tap being formed from the position of a conductor or a coil, and with the input means which is antenna equipment with which the electric supply terminal is taken out from there A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.

[0022] A conductor is connected. this invention (it corresponds to claim 48) -- the two poles of a coil -- respectively -- at least one or more lines -- the neutral point of a coil to a grounding terminal -- moreover -- each -- a line -- a tap being formed from the position of a conductor or a coil, and with the input means which is antenna equipment with which the electric supply terminal is taken out from there A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[0023] this invention (it corresponds to claim 49) A conductor minds a coil. at least one or more lines -- The input means which is one or antenna equipment formed two to the electric supply section, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.

[0024] this invention (it corresponds to claim 50) A conductor minds a coil. at least one or more lines -- The input means which is one or antenna equipment formed two to the electric supply section, A receiving means to perform frequency conversion of the signal acquired from said input

means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[0025] The main antenna elements by which, as for this invention (it corresponds to claim 57), the predetermined part was grounded, One or more antenna elements by which contiguity arrangement is carried out at the main antenna element, it is relatively shorter than said main antenna elements, and both ends are not grounded, The input means which is antenna equipment equipped with one or more antenna elements by which contiguity arrangement is carried out at said main antenna elements, it is relatively longer than said main antenna elements, and both ends are not grounded, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.

[0026] The main antenna elements by which, as for this invention (it corresponds to claim 58), the predetermined part was grounded, One or more antenna elements by which contiguity arrangement is carried out at the main antenna element, it is relatively shorter than said main antenna elements, and both ends are not grounded, The input means which is antenna equipment equipped with one or more antenna elements by which contiguity arrangement is carried out at said main antenna elements, it is relatively longer than said main antenna elements, and both ends are not grounded, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[0027] This invention (it corresponds to claim 67) is a digital television broadcast receiving set characterized by connecting the ground section to a conductor cope plate and its conductor cope plate, having the antenna element by which contiguity arrangement was carried out, and arranging the field of said conductor cope plate which counters said antenna element at least rather than said antenna element at the communications-partner side.

[0028] The antenna element by which, as for this invention (it corresponds to claim 70), contiguity arrangement of the ground section was connected and carried out at a conductor cope plate and its conductor cope plate, The input means which is antenna equipment equipped with a rotation means to rotate said conductor cope plate and said antenna element with the arrangement condition, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic

means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[0029] The antenna element by which, as for this invention (it corresponds to claim 71), contiguity arrangement of the ground section was connected and carried out at a conductor cope plate and its conductor cope plate, The input means which is antenna equipment equipped with a rotation means to rotate said conductor cope plate and said antenna element with the arrangement condition, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[0030] The antenna element by which, as for this invention (it corresponds to claim 72), contiguity arrangement of the ground section was connected and carried out at a conductor cope plate and its conductor cope plate, The input means which is between said conductor cope plates and said antenna elements, and is antenna equipment equipped with the ferroelectric installed around said antenna element, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[0031] The antenna element by which, as for this invention (it corresponds to claim 73), contiguity arrangement of the ground section was connected and carried out at a conductor cope plate and its conductor cope plate, The input means which is between said conductor cope plates and said antenna elements, and is antenna equipment equipped with the ferroelectric installed around said antenna element, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[0032] As for this invention (it corresponds to claim 75), the ground section is connected to a conductor cope plate and its conductor cope plate. The input means which is antenna equipment with which it has the antenna element by which contiguity arrangement was carried out, and said

antenna element is formed in the configuration doubled with the configuration of said conductor cope plate, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.

[0033] As for this invention (it corresponds to claim 76), the ground section is connected to a conductor cope plate and its conductor cope plate. The input means which is antenna equipment with which it has the antenna element by which contiguity arrangement was carried out, and said antenna element is formed in the configuration doubled with the configuration of said conductor cope plate, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[0034] Two or more different antenna elements of the die length by which the ground section was connected to a conductor cope plate and its conductor cope plate by this invention (it corresponds to claim 78), and contiguity arrangement was carried out corresponding to the tuning frequency of two or more bands, An input means to transform into an electrical signal the electromagnetic wave which is antenna equipment about two or more electric supply sections prepared in each of two or more of the antenna elements, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.

[0035] Two or more different antenna elements of the die length by which the ground section was connected to a conductor cope plate and its conductor cope plate by this invention (it corresponds to claim 79), and contiguity arrangement was carried out corresponding to the tuning frequency of two or more bands, The input means which is antenna equipment which has two or more electric supply sections prepared in each of two or more of the antenna elements, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input,

It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[0036] The ground section is connected to a conductor cope plate and its conductor cope plate, and this invention (it corresponds to claim 80) is equipped with the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which is the part which forms the perpendicular-on parenchyma wall of a vehicle, and is antenna equipment with which the electric field of the antenna element are formed in real waterworks Taira, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[0037] The ground section is connected to a conductor cope plate and its conductor cope plate, and this invention (it corresponds to claim 81) is equipped with the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which is the part which forms the perpendicular-on parenchyma wall of a vehicle, and is antenna equipment with which the electric field of the antenna element are formed in real waterworks Taira, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[0038] The ground section is connected to a conductor cope plate and its conductor cope plate, and this invention (it corresponds to claim 82) is equipped with the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which is the part which forms the real waterworks flat wall of a vehicle, and is antenna equipment with which the electric field of the antenna element were formed in the parenchyma top perpendicular, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[0039] The ground section is connected to a conductor cope plate and its conductor cope plate, and this invention (it corresponds to claim 83) is equipped with the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which is the

part which forms the real waterworks flat wall of a vehicle, and is antenna equipment with which the electric field of the antenna element were formed in the parenchyma top perpendicular, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[0040] The ground section is connected to a conductor cope plate and its conductor cope plate, and this invention (it corresponds to claim 84) is equipped with the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which are some housing walls of mobile equipment and is antenna equipment with which the antenna element is arranged at the interior side of said housing wall, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.

[0041] The ground section is connected to a conductor cope plate and its conductor cope plate, and this invention (it corresponds to claim 85) is equipped with the antenna element by which contiguity arrangement was carried out. Said conductor cope plate The input means which are some housing walls of mobile equipment and is antenna equipment with which the antenna element is arranged at the interior side of said housing wall, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.

[0042] A conductor cope plate and its conductor cope plate are equipped with the antenna element by which contiguity arrangement was carried out, the predetermined part of said antenna element is formed with the coil or the conductor of a zigzag configuration, and this invention (it corresponds to claim 86) is a digital television broadcast receiving set characterized by the end of said antenna element being grounded by said conductor cope plate.

[0043] It has a conductor cope plate and two or more antenna elements from which the die length arranged by approaching the conductor cope plate differs, each predetermined part of said antenna element is formed with the coil or the conductor of a zigzag configuration, and this invention (it corresponds to claim 88) is a digital television broadcast receiving set characterized by one edge each of said antenna element being grounded by said conductor cope plate in common.

[0044] This invention (it corresponds to claim 89) is equipped with a conductor cope plate, two or more antenna elements from which the die length arranged by approaching the conductor cope plate

differs, and the coil connected at the common node of one edge each of these antenna elements or the conductor of a zigzag configuration, and is said coil or a digital television broadcast receiving set characterized by the other end of the conductor of a zigzag configuration being grounded by said conductor cope plate.

[0045] It is the digital television broadcast receiving set characterized by equipping this invention (it corresponding to claim 92) with the antenna element which the whole was formed with the coil or the conductor of a zigzag configuration, and was formed in the configuration with at least one or more flections or bends.

[0046] This invention (it corresponds to claim 93) is a digital television broadcast receiving set characterized by connecting the insulator top which the end was grounded by a conductor cope plate and its conductor cope plate, equipped them with the antenna element by which contiguity arrangement was carried out, and prepared the electric supply section on said conductor cope plate as a relay point.

[0047] An end is grounded by a conductor cope plate and its conductor cope plate, and this invention (it corresponds to claim 94) equips them with the antenna element by which contiguity arrangement was carried out, and forms a through tube in said conductor cope plate, and said antenna element of the through tube is a digital television broadcast receiving set characterized by forming an insulator on said conductor cope plate of the opposite side, and connecting the electric supply section on said insulator through said through tube.

[0048] The antenna element by which contiguity arrangement of this invention (it corresponds to claim 96) was carried out at a conductor cope plate and its conductor cope plate, It has a case. the conductor which is prepared between the antenna element and said conductor cope plate, and has a through tube into a predetermined part -- The electric supply section is connected to one on two or more insulators formed on said conductor cope plate within a case through said through tube. the end of said antenna element -- said conductor -- a case -- grounding -- said conductor -- It is the digital television broadcast receiving set characterized by connecting passive circuit elements on between said two or more insulators.

[0049] The insulator plate with which contiguity arrangement of this invention (it corresponds to claim 97) was carried out at a conductor cope plate and its conductor cope plate, The antenna element formed on said insulator plate of a side far from said conductor cope plate, It connects with the conductor which penetrates said insulator plate from the antenna element, and its conductor. It has the conductor formed in the opposite side with the field in which said antenna element of said insulator plate was formed. It is the digital television broadcast receiving set characterized by for the end of said antenna element being grounded by said conductor cope plate, and connecting the electric supply section near said said grounded end of said conductor.

[0050] The insulator plate with which this invention (it corresponds to claim 98) was prepared on a conductor cope plate and its conductor cope plate, a conductor with an area it is prepared on the insulator plate and smaller than said conductor cope plate -- with a plate the conductor -- contiguity arrangement is carried out at a plate -- having -- said conductor -- with the input means which is antenna equipment which equipped the plate with the antenna element by which the end was grounded A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control

means.
[0051] The insulator plate with which this invention (it corresponds to claim 99) was prepared on a conductor cope plate and its conductor cope plate, a conductor with an area it is prepared on the insulator plate and smaller than said conductor cope plate -- with a plate the conductor -- contiguity arrangement is carried out at a plate -- having -- said conductor -- with the input means which is antenna equipment which equipped the plate with the antenna element by which the end was grounded A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[0052] The conductor cope plate with which, as for this invention (it corresponds to claim 103), the electric conduction plate for antenna touch-down was formed in the predetermined part, The input means which is antenna equipment equipped with the antenna element by which it has been arranged near the conductor cope plate, and the end was connected to said electric conduction plate for antenna touch-down, A delay means to input the signal from said input means and to delay it, and the signal acquired from said delay means, A synthetic means to compound the signal acquired from said input means, and a recovery means to change into the signal of baseband about the signal acquired from said synthetic means, A delay wave presumption means to presume the delay wave contained in the signal which considers the signal which shows the recovery situation acquired from said recovery means as an input, and is acquired with said input means, The synthetic control means which controls said synthetic means and said delay means according to the signal acquired from said delay wave presumption means is provided. It is the digital television broadcast receiving set characterized by controlling at least one side of a time delay setup with the rate of composition and said delay means of a signal in said synthetic means according to the signal of said synthetic control means.
[0053] The conductor cope plate with which, as for this invention (it corresponds to claim 104), the electric conduction plate for antenna touch-down was formed in the predetermined part, The input means which is antenna equipment equipped with the antenna element by which it has been arranged near the conductor cope plate, and the end was connected to said electric conduction plate for antenna touch-down, A receiving means to perform frequency conversion of the signal acquired from said input means, and a recovery means to change the signal from said receiving means into the signal of baseband, A delay wave presumption means to presume the delay wave contained in the signal acquired with an input means by considering information on the recovery situation acquired with said recovery means as an input, It is the digital television broadcast receiving set characterized by controlling the transfer function treated with said recovery means based on the control signal which possesses the recovery control means which controls said recovery means based on the delay wave information from said delay wave presumption means, and is acquired by said recovery control means.
[0054]
[Embodiment of the Invention] The gestalt of operation of the antenna equipment used for the digital television broadcast receiving set concerning this invention is explained based on a drawing.
(1) Explain the gestalt of operation of the antenna equipment first used for the digital television broadcast receiving set concerning this invention in the first half based on a drawing.
[0055] The principle of the antenna in the gestalt of this operation is explained. As the term of the conventional technique explained, when the conventional antenna approaches a conductor cope

plate and it is installed, the car body used as a conductor cope plate affects antenna engine performance, such as directional gain, like a monopole antenna. By using conversely the effect of the antenna on this conductor cope plate, directivity turns into indirectivity, and directional gain of this invention improves, and it realizes the antenna with which high selectivity is acquired.
(Gestalt 1 of operation) Drawing 1 is the sketch block diagram showing the antenna equipment in the gestalt of the 1st operation concerning this invention. namely, the line in which drawing 1 (a) has two flections for an antenna element 101 -- it is antenna equipment which consisted of conductors, formed the electric supply terminal 102 in the predetermined location of the antenna element 101, and grounded the end section 103. moreover, the line in which drawing 1 (b) has four flections for an antenna element 104 -- it is antenna equipment which consisted of conductors, formed the electric supply terminal 102 in the predetermined location of the antenna element 104, and grounded the end section 103. Thus, since the antenna equipment of the gestalt of this operation is making the antenna element of a monopole antenna crooked, it can make installation area small.
[0056] Drawing 2 is the sketch block diagram showing the example which carried out contiguity arrangement of the antenna equipment with the same configuration as the above at the conductor cope plate. namely, the line in which drawing 2 (a) has two flections for an antenna element 201 -- it is antenna equipment which consisted of conductors, carried out contiguity arrangement of the antenna element 201 so that the conductor cope plate 205 and an antenna flat surface might become parallel, formed the electric supply terminal 202 in the predetermined location of an antenna element 201, and grounded the end section 203 to the conductor cope plate 205. moreover, the line in which drawing 2 (b) has four flections for an antenna element 204 -- it constitutes from a conductor, contiguity arrangement of the antenna element 204 is carried out so that the conductor cope plate 205 and an antenna flat surface may become parallel, and it is antenna equipment which prepared and grounded the end section 203 to the conductor cope plate 205 electric supply terminal 202 in the predetermined location of an antenna element 204. Thus, since it is carrying out contiguity arrangement of the antenna equipment of the gestalt of the 1st operation mentioned above so that an antenna flat surface may become parallel to the conductor cope plate 205, its directional-gain engine performance improves, while the antenna equipment of the gestalt of this operation can make installation area small. In addition, the number of the flections of an antenna element is not limited to the number shown in the above-mentioned example. This is the same also in the gestalt of subsequent operations.
[0057] The example of the antenna of drawing 2 (a) is shown in drawing 85 . the line bent by two places in drawing 85 -- the antenna element 8501 of a conductor sets predetermined spacing to the conductor cope plate 8504, an antenna flat surface is arranged almost in parallel, and the end section of an antenna element 8501 is connected to the edge of the electric conduction plate 8503 for antenna touch-down prepared almost at right angles to the conductor cope plate 8504. Here, a plane area and the area of the conductor cope plate 8504 which an antenna element 8501 forms presuppose that it is almost equivalent. Moreover, the electric supply section 8502 is formed in the middle of the antenna element 8501.
[0058] The electric conduction plate 8503 has sufficiently large width of face, i.e., width of face which does not have practically the effect of the reactance determined with the tuning frequency of an antenna element 8501, to the width of face of an antenna element 8501. For this reason, it acts as a ground. When width of face is small, it combines with an antenna element 8501, and the whole serves as an antenna element and differs from the thing of this invention. The overall length of a component is set to 220mm, width of face is set to 2mm, and an antenna element 8501 becomes miniaturizable, when wavelength is set to 940mm. Here, as long as an antenna flat surface and the field of a conductor cope plate are range which the effective potential difference between an antenna element and a cope plate produces, you may incline. Moreover, when the area of a conductor cope plate is larger than the area of an antenna flat surface (for example, 4 times), to a vertically polarized wave, gain is the same and gain falls to a horizontally polarized wave.

[0059] Although the engine performance will fall, for example if reverse F conventional antennas bring an antenna element close to an earth plate if the difference between the antenna of the gestalt of this operation and the conventional antenna is described, the engine performance of antenna equipment of this invention improves conversely.
[0060] The impedance characteristic and VSWR property of an antenna of drawing 85 are shown in drawing 86 . Moreover, directive gain characteristics are shown in drawing 87 . As shown in drawing 87 , the antenna of drawing 85 shows almost circular directivity to a vertically polarized wave.
[0061] In addition, it cannot be overemphasized that the configuration and element number of an antenna element are not limited to this example.
[0062] Moreover, if spacing of a conductor cope plate and an antenna element is 1/40 or more [of wavelength], it is more desirable.
(Gestalt 2 of operation) Drawing 3 is the sketch block diagram concerning this invention showing the antenna equipment of the gestalt of the 2nd operation. namely, the line in which drawing 3 (a) has four flections for an antenna element 301 -- it is antenna equipment which constituted the dipole antenna from a conductor, formed the electric supply terminal 302 in the predetermined location of the antenna element 301, and grounded the end section 303. moreover, the line in which drawing 3 (b) has eight flections for an antenna element 304 -- it is antenna equipment which constituted the dipole antenna from a conductor, formed the electric supply terminal 302 in the predetermined location of the antenna element 304, and grounded the end section 303. Thus, since the antenna equipment of the gestalt of this operation is made crooked so that the antenna element of a dipole antenna may be involved in, it can make installation area small.
[0063] Drawing 4 is the sketch block diagram showing the example which carried out contiguity arrangement of the antenna equipment with the same configuration as the above at the conductor cope plate. namely, the line in which drawing 4 (a) has four flections for an antenna element 401 -- it is antenna equipment which constituted the dipole antenna from a conductor, carried out contiguity arrangement of the antenna element 401 so that the conductor cope plate 405 and an antenna flat surface might become parallel, formed the electric supply terminal 402 in the predetermined location of an antenna element 401, and grounded the end section 403 to the conductor cope plate 405. moreover, the line in which drawing 4 (b) has eight flections for an antenna element 404 -- a dipole antenna is constituted from a conductor, contiguity arrangement of the antenna element 404 is carried out so that the conductor cope plate 405 and an antenna flat surface may become parallel, and it is antenna equipment which prepared and grounded the end section 403 to the conductor cope plate 405 electric supply terminal 402 in the predetermined location of an antenna element 401. Thus, when contiguity arrangement of the antenna equipment is carried out so that an antenna flat surface may become parallel to the conductor cope plate 405 while the antenna equipment of the gestalt of this operation can make installation area small, its directional-gain engine performance improves further.
(Gestalt 3 of operation) Drawing 5 is the sketch block diagram concerning this invention showing the antenna equipment of the gestalt of the 3rd operation. Namely, drawing 5 (a) has two flections and the antenna elements 501a, 501b, and 501c of three monopoles from which component length differs are arranged on the same flat surface. Between the tap of antenna elements 501a, 501b, and 501c, and the electric supply terminal 503, and between the electric supply terminal 503 and an earth terminal 505 In order to adjust an impedance, respectively, it is antenna equipment of a configuration of having connected reactive elements 502a, 502b, 502c, and 504. Moreover, drawing 5 (b) changes the antenna elements 501a, 501b, and 501c of the antenna equipment of above-mentioned drawing 5 (a) into the antenna elements 506a, 506b, and 506c with four flections.
[0064] In the above-mentioned configuration, the antenna equipment which has a desired frequency band is realizable by setting predetermined spacing and setting up the tuning frequency of each antenna element. Drawing 4040 becomes possible [giving broadband frequency characteristics] by compounding, although it is drawing showing a synthetic band in case antenna elements are seven

antennas and the bandwidth of one antenna element is narrow.
[0065] The VSWR property of drawing 9393 shows the concrete example of this band composition from drawing 88 . That is, it is an example using four antenna elements from which tuning frequency differs, and tuning frequency is 196.5MHz (drawing 88), 198.75MHz (drawing 89), 200.5MHz (drawing 90 R> 0), and 203.75MHz (drawing 91), respectively. Drawing 92 is a VSWR property Fig. when carrying out band composition of these antenna elements, and is understood are broadband-ized. Moreover, drawing 93 is drawing (5 times) when taking the large range in the axis of ordinate at this time.
[0066] Drawing 6 is the sketch block diagram showing the example which carried out approach arrangement of the antenna equipment with the same configuration as above-mentioned drawing 5 at the conductor cope plate. This antenna equipment is the configuration which carried out contiguity arrangement of the antenna equipment of the configuration same to the conductor cope plate 607 as above-mentioned drawing 5 so that an antenna flat surface might become parallel. Namely, drawing 6 (a) has two flections, and approaches and arranges the antenna elements 601a, 601b, and 601c of three monopoles from which component length differs to the conductor cope plate 607 on the same flat surface. Between the tap of antenna elements 601a, 601b, and 601c, and the electric supply terminal 603, and between the electric supply terminal 603 and an earth terminal 605 In order to adjust an impedance, respectively, it is antenna equipment of a configuration of having connected reactive elements 602a, 602b, 602c, and 604. Moreover, drawing 6 (b) changes the antenna elements 601a, 601b, and 601c of the antenna equipment of above-mentioned drawing 6 (a) into the antenna elements 606a, 606b, and 606c with four flections.
[0067] Drawing 7 is the sketch block diagram showing another example of the antenna equipment of the gestalt of this operation again. That is, drawing 7 (a) is the configuration of having formed the reactive elements 708a and 708b for band composition between each antenna elements 701a and 701b and 701c, in the antenna equipment of the same configuration as above-mentioned drawing 5 (a). Moreover, drawing 7 (b) is the configuration of having formed the reactive elements 708a and 708b for band composition between each antenna elements 706a and 706b and 706c, in the antenna equipment of the same configuration as above-mentioned drawing 5 (b). With the configuration of drawing 5 (a) and (b), although each reactive elements 502a, 502b, and 502c were also making the function of band composition serve a double purpose, in the gestalt of this operation, they are written as the configuration into which the function of band composition was made to divide, and accommodation of impedance adjustment and band composition becomes easy to carry them out.
[0068] Drawing 8 is the sketch block diagram showing still more nearly another example of the antenna equipment of the gestalt of this operation. This antenna equipment is the configuration which carried out contiguity arrangement of the antenna equipment which has the same configuration as above-mentioned drawing 7 in the conductor cope plate 807 so that an antenna flat surface might become parallel. That is, drawing 8 (a) is the configuration of having formed the reactive elements 808a and 808b for band composition between each antenna elements 801a and 801b and 801c, in the antenna equipment of the same configuration as above-mentioned drawing 6 (a). Moreover, drawing 8 (b) is the configuration of having formed the reactive elements 808a and 808b for band composition between each antenna elements 806a and 806b and 806c, in the antenna equipment of the same configuration as above-mentioned drawing 6 (b).
(Gestalt 4 of operation) Drawing 9 is the sketch block diagram concerning this invention showing the antenna equipment of the gestalt of the 4th operation. Namely, drawing 9 (a) has four flections and the antenna elements 901a, 901b, and 901c of three dipoles from which component length differs are arranged on the same flat surface. Between the tap of antenna elements 901a, 901b, and 901c, and the electric supply terminal 903, and between the electric supply terminal 903 and an earth terminal 905 In order to adjust an impedance, respectively, it is antenna equipment of a configuration of having connected reactive elements 902a, 902b, 902c, and 904. Moreover, drawing 9 (b) changes the antenna elements 901a, 901b, and 901c of the antenna equipment of above-

mentioned drawing 9 (a) into the antenna elements 906a, 906b, and 906c with eight flections.
[0069] In the above-mentioned configuration, the antenna equipment which has a desired frequency band is realizable by setting predetermined spacing and setting up the tuning frequency of each antenna element.
[0070] Drawing 10 is the sketch block diagram showing another example of the antenna equipment of the gestalt of this operation. This antenna equipment is the configuration which carried out contiguity arrangement of the antenna equipment which has the same configuration as above-mentioned drawing 9 in the conductor cope plate 1007 so that an antenna flat surface might become parallel. That is, drawing 10 (a) is antenna equipment of a configuration of having connected reactive elements 1004, 1005, 1006, and 1009, in order to have four flections, to carry out contiguity arrangement of the antenna elements 1001, 1002, and 1003 of three dipoles from which component length differs on the same flat surface at the conductor cope plate 1007 and to adjust an impedance, respectively between the tap of antenna elements 1001, 1002, and 1003, and the electric supply terminal 1008, and between the electric supply terminal 1008 and an earth terminal 1010. Moreover, drawing 10 (b) changes the antenna elements 1001, 1002, and 1003 of the antenna equipment of above-mentioned drawing 10 (a) into the antenna elements 1011, 1012, and 1013 with eight flections.
[0071] Drawing 11 is the sketch block diagram showing another example of the antenna equipment of the gestalt of this operation again. That is, drawing 11 (a) is the configuration of having divided the reactive elements 1114, 1115, 1116, and 1117 for band composition between each antenna elements 1101 and 1102 and 1103 at two places, and having prepared, in antenna equipment with the same configuration as above-mentioned drawing 9 (a). Moreover, drawing 11 (b) is the configuration of having divided the reactive elements 1114, 1115, 1116, and 1117 for band composition between each antenna elements 1111 and 1112 and 1113 at two places, and having prepared, in antenna equipment with the same configuration as above-mentioned drawing 9 (b). With the configuration of drawing 9 (a) and (b), although each reactive elements 902a, 902b, and 902c were also making the function of band composition serve a double purpose, in the gestalt of this operation, they are written as the configuration into which the function of band composition was made to divide, and accommodation of impedance adjustment and band composition becomes easy to carry them out.
[0072] Drawing 12 is the sketch block diagram showing still more nearly another example of the antenna equipment of the gestalt of this operation. This antenna equipment is the configuration which carried out contiguity arrangement of the antenna equipment which has the same configuration as above-mentioned drawing 11 in the conductor cope plate 1207 so that an antenna flat surface might become parallel. That is, drawing 12 (a) is the configuration of having divided the reactive elements 1214, 1215, 1216, and 1217 for band composition between each antenna elements 1201 and 1202 and 1203 at two places, and having prepared, in antenna equipment with the same configuration as above-mentioned drawing 10 (a). Moreover, drawing 12 (b) is the configuration of having divided the reactive elements 1214, 1215, 1216, and 1217 for band composition between each antenna elements 1211 and 1212 and 1213 at two places, and having prepared, in antenna equipment with the same configuration as above-mentioned drawing 10 (b).
(Gestalt 5 of operation) Drawing 13 is the sketch block diagram concerning this invention showing the antenna equipment of the gestalt of the 5th operation. That is, drawing 13 (a) is the antenna equipment in which each antenna elements 1301, 1302, and 1303 of three dipole antennas with which component length differs were formed on the printed circuit board 1304. Moreover, drawing 13 (b) is antenna equipment with which the antenna element 1320 formed the conductor cope plate 1308 on the printed circuit board 1304 in the field of the opposite side in the antenna equipment of the same configuration as above-mentioned drawing 13 (a). Thus, while the configuration which forms antenna elements 1301, 1302, and 1303 (1305, 1306, 1307) and the conductor cope plate 1308, then space-saving-ization of an antenna are attained using a printed circuit board, production

is easy and stability's [the dependability and stability] of the engine performance improves.
[0073] Drawing 14 is the sketch block diagram showing another example of the antenna equipment of the gestalt of this operation. This antenna equipment is the configuration that the antenna element of a printed circuit board formed the conductor for band composition in the field of the opposite side at the thing of the same configuration as above-mentioned drawing 13 (a) so that an antenna element might be intersected. That is, the field in which drawing 14 (a) formed each antenna elements 1401, 1402, and 1403 of three dipole antennas with which component length differs on the printed circuit board 1404, and the antenna element 1410 of a printed circuit board 1404 was formed is antenna equipment of a configuration of having formed two conductors 1405 in the direction which intersects an antenna element in the field of the opposite side. Moreover, in the antenna equipment of the same configuration as above-mentioned drawing 14 (a), the antenna element 1410 of drawing 14 (b) is antenna equipment which carried out contiguity arrangement of the conductor cope plate 1406 in the opposite side. This conductor cope plate 1406 may be formed on a printed circuit board using a multilayer printed board. By the above configuration, production of the component for band composition becomes easy.
(Gestalt 6 of operation) Drawing 15 is the sketch block diagram concerning this invention showing the antenna equipment of the gestalt of the 6th operation. The gestalt of this operation is antenna equipment of a configuration of having contained antenna elements 1501, 1502, and 1503 in the crevice 1505 established in the conductor cope plate 1504. The protrusion from car bodies, such as an automobile, is lost by this configuration, and the directional-gain engine performance can be improved by the interaction of the circumference edge of an antenna element 1510, and the conductor cope plate 1504.
[0074] Drawing 16 is the sketch block diagram showing another example of the antenna equipment of the gestalt of this operation. The antenna equipment of drawing 16 (a) is antenna equipment of a configuration of having contained in the crevice 1605 which has arranged the antenna 1610 which consists of antenna elements 1601, 1602, and 1603, and the antenna 1620 which consists of antenna elements 1606, 1607, and 1608 in the same flat surface, and was established in the conductor cope plate 1604. Although the antenna 1610 and the antenna 1620 are here constituted from an antenna of different size and a configuration, the same size and a configuration are sufficient. In addition, an antenna is arranged so that each electric supply section may approach. Moreover, drawing 16 (b) is drawing showing the example which carried out contiguity arrangement of the same antenna at the plane conductor cope plate 1609.
[0075] Drawing 17 is the sketch block diagram showing another example of the antenna equipment of the gestalt of this operation again. The antenna equipment of drawing 17 (a) is antenna equipment of a configuration of having contained in the crevice 1705 which has arranged the upper antenna 1710 and the lower antenna 1720 which consist of antenna elements 1701, 1702, and 1703 up and down, and was established in the conductor cope plate 1704. Here, although the antenna 1710 and the antenna 1720 are constituted from same size and a configuration, you may differ. Moreover, drawing 17 (b) is drawing showing the example which carried out contiguity arrangement of the same antenna at the plane conductor cope plate 1706. When the size of such each antenna element is the same, all tuning frequency is the same. since [therefore,] the gain of each antenna element is accumulated compared with the case where an antenna element is single as shown in drawing 41 although the bandwidth as the whole antenna equipment is the same as that of the case of a single component -- the gain as the whole antenna equipment -- high -- becoming -- high interest profit -- high -- a selectivity antenna is realizable.
[0076] Drawing 18 is the sketch block diagram showing another example of the antenna equipment of the gestalt of this operation further again. The antenna equipment of drawing 18 (a) is antenna equipment of a configuration of having contained in the crevice 1805 which each formed three antennas 1801, 1802, and 1803 which consist of antenna elements of two or more dipole molds which have a flection using the multilayer printed board 1806, and prepared it in the conductor cope

plate 1804. Here, although three antennas 1801, 1802, and 1803 are constituted from same size and a configuration, you may differ. Moreover, although the antenna was set to three, the stratification or more of four may be carried out. Drawing 18 (b) is drawing showing the example which carried out contiguity arrangement of the same antenna at the plane conductor cope plate 1807. Thus, the configuration which carries out the laminating of two or more antennas using a multilayer printed board, then high interest profit and the existing antenna of high selectivity are obtained simply.
(Gestalt 7 of operation) Drawing 19 is the sketch block diagram concerning this invention showing two examples of the antenna of the gestalt of the 7th operation. the line in which the antenna of the gestalt of this operation has four flections, respectively -- it has the composition of having had two conductors to the electric supply section. namely, drawing 19 (a) -- the same antenna equipment as above-mentioned drawing 3 (b) -- it is -- the deflection direction of crookedness -- in view of the feeding point 1901 -- two lines of hard flow -- the thing which has conductors 1902 and 1903, and drawing 19 (b) -- the direction of crookedness -- in view of the feeding point 1901 -- two lines of this direction -- what has conductors 1904 and 1905 is shown. With this configuration, it can miniaturize on a flat surface and, in addition, indirectivity can be realized.
[0077] On the other hand, drawing 20 (a) shows the antenna equipment with which the die length from the electric supply section 2001 to the 1st folding point P has the long antenna element 2002 more relatively than the die length from the 1st folding point P to the 2nd folding point Q. Moreover, drawing 20 (b) shows the antenna equipment with which the die length from the electric supply section 2001 to the 1st folding point P has the short antenna element 2002 more relatively than the die length from the 1st folding point P to the 2nd folding point Q. With the above configuration, installation becomes possible also in a long and slender location.
[0078] the gestalt of this operation -- setting -- a line -- although the conductor showed two things to the electric supply section, you may be not only this but one thing. Moreover, the number of flections is not limited to these, either.
[0079] the gestalt of this operation -- setting -- a line -- although the conductor showed two things to the electric supply section, you may be not only this but one thing. Moreover, the number of flections is not limited to these, either.
[0080] moreover, the gestalt of this operation -- setting -- a line -- although shown, it may be curving and may become [the conductor is crooked to have become] spiral-like. for example, two lines in which the curve direction had a reverse bend, in view of the electric supply section 2101 as shown in drawing 21 (a) -- two lines in which the curve direction had the same bend, in view of the configuration which has conductors 2102 and 2103, or the electric supply section 2101 -- a configuration with conductors 2104 and 2105 may be used. moreover, it is shown in drawing 21 (b) -- as -- in view of the electric supply section 2101 -- the winding direction -- two lines of the shape of a spiral of hard flow -- in view of a configuration configuration with conductors 2106 and 2107, or the electric supply section 2101 -- the winding direction -- two lines of the shape of a spiral of this direction -- a configuration configuration with conductors 2108 and 2109 may be used.
[0081] Moreover, although it is easy to be natural even if it forms an antenna element by processing of a metal member when creating the antenna of the gestalt of this operation, a printed circuit may be used and formed on a substrate. By using a printed circuit, creation of an antenna becomes very easy and cost reduction, a miniaturization, the improvement in dependability, etc. can be expected.
[0082] Moreover, the antenna of the gestalt of this operation is applicable similarly about the gestalt of subsequent operations.
(Gestalt 8 of operation) Drawing 22 is the sketch block diagram concerning this invention showing an example of the antenna equipment of the gestalt of the 8th operation. The antenna equipment of the gestalt of this operation is arranged at contiguity at a conductor cope plate, and has the composition that the grounding terminal and cope plate of an antenna were connected. For example, as shown in drawing 22 (a), an antenna element 2201 is arranged at contiguity at a cope plate 2204, and the grounding terminal 2203 is connected to the cope plate 2204. In addition, although this

antenna equipment is similar with the configuration of drawing 4 (b) mentioned above, the points prepared in the location where the electric supply terminal 2202 penetrated the conductor cope plate 2204 differ. The above configuration enables it to obtain a desired impedance characteristic and directivity.

[0083] Moreover, drawing 22 (b) has the composition of having prepared the switching element between the grounding terminal of an antenna, and the conductor cope plate. As shown in this drawing, it can consider as the configuration which chooses the condition that the optimal radio wave propagation is obtained by the case where form a switching element 2205 between the grounding terminal 2203 of an antenna element 2201, and the conductor cope plate 2204, and it does not consider as the case where it connects. In this case, it may constitute so that a switching element 2205 can be operated by remote control, and you may control according to the receive state of an electric wave. Here, when a grounding terminal 2203 is connected, it becomes an antenna for vertically polarized waves, and when not connecting, it becomes an antenna for horizontally polarized waves.

[0084] Moreover, although above-mentioned drawing 22 (b) showed the case where the electric supply terminal 2202 had penetrated the conductor cope plate 2204, as shown not only in this but in drawing 23 , the electric supply terminal 2302 and the grounding terminal 2303 may not penetrate the conductor cope plate 2304.

[0085] Drawing 24 is also ****** about the physical relationship of the conductor cope plate in the gestalt of this operation, and an antenna. As shown in drawing 24 (a), conductor cope plate 2402 flat surface and antenna 2401 flat surface kept their distance h, and they arrange so that it may become parallel. In this case, it is possible by controlling this distance h to also make it change towards a request of the directivity of an antenna 2401. Moreover, when an antenna 2401 and the conductor cope plate 2402 approach, tuning frequency becomes high, and tuning frequency becomes low when it separates. Therefore, what is necessary is just to consider as the configuration which controls distance h according to the receive state of propagation. Control of this distance h may be performed by adjusting the amount of insertion of a spacer by being good also as a configuration which moves it in the perpendicular direction to an antenna flat surface using a delivery device, a sliding mechanism, etc. although an antenna 2401 is not illustrated, or inserting the spacer of the insulator which is not illustrated between an antenna 2401 and the conductor cope plate 2402 again, and moving that spacer in the direction parallel to an antenna flat surface. In order to obtain the desired antenna engine performance here at the time of antenna production, you may make it determine the size of a spacer. In addition, to the spacer between a cope plate and an antenna, use of low dielectric constant ingredients, such as styrene foam, is possible.

[0086] Moreover, as shown in drawing 24 (b), you may configurate so that it may have the predetermined include angle theta (in this case, 90 degrees) between conductor cope plate 2402 flat surface and antenna 2403 flat surface. Directive control of an antenna 2403 is possible by adjusting this predetermined include angle theta using a hinge device etc.

[0087] Furthermore, although the gestalt of this operation showed the case where the number of antenna elements was one, not only this but two or more are sufficient. Moreover, although the independent conductor constituted the cope plate, the car body of an automobile etc. can be used as a cope plate, for example.

(Gestalt 9 of operation) Drawing 25 is the mimetic diagram concerning this invention showing the example of the antenna equipment of the gestalt of the 9th operation. It has composition which arranges two or more antenna elements and uses them as one antenna by the antenna element group formed into single electric supply in the predetermined range. As shown in drawing 25 (a), two or more antenna elements 2501, 2502, and 2503 are formed into single electric supply, and one antenna consists of antenna element groups. For example, the broadband antenna which covers a desired frequency band as a whole is realizable by covering the frequency band where two or more antenna elements of each differ. In arrangement like especially drawing 25 (a), it is inevitably easy to

set the short antenna 2503 as comparatively high tuning frequency for the long antenna 2501 of component length at comparatively low tuning frequency, since the component length of the outside antenna 2501 becomes longer than the component length of the inside antenna 2503, and the antenna which covers a wide band as a whole can be constituted.
[0088] Moreover, although an antenna element shares an antenna flat surface as shown in 25 (b), the arrangement which does not enter mutually is sufficient.
[0089] Moreover, when the band which two or more antenna elements of each cover is the same, it is also possible to gather antenna efficiency.
[0090] Moreover, in order to obtain the isolation between each antenna elements, the distance between each antenna element may be arranged with spacing which obtains predetermined isolation, and an isolator or a reflector may be connected to each antenna element.
[0091] In addition, in the gestalt of this operation, although the number of antenna elements was set to two or three, the number of antenna elements is not limited to this that what is necessary is just two or more.
(Gestalt 10 of operation) Drawing 26 is the mimetic diagram concerning this invention showing the example of the antenna equipment of the gestalt of the 10th operation. The point that the gestalt of this operation differs from the gestalt of implementation of the above 9th is arranged so that antenna elements 2601, 2602, and 2603, or 2604, 2605 and 2606 may become stratified in the perpendicular direction to a base plane, as shown in drawing 26 R> 6 (a). In addition, as shown in the left figure, all may lap, as shown in the right figure, the part may lap, and the arrangement condition in the plane of projection to an antenna element may be further separated. It is a notching Fig. a part and drawing 26 (b) shows the condition for which shows the example of application of the gestalt of this operation, and the antennas 2611 and 2612 which used and formed the printed circuit on the multilayer printed board 2609 are shown that a part of arrangement on the horizontal plane of an antenna has lapped. Association in the predetermined location of both components becomes possible by letting a conductor pass to a through hole 2610.
(Gestalt 11 of operation) Drawing 27 is the mimetic diagram concerning this invention showing the example of the antenna equipment of the gestalt of the 11th operation, and drawing 2727 (a) shows an example of the electric supply section of the antenna which formed two or more antenna element groups into single electric supply. As shown in drawing 27 (a), taps 2704, 2705, and 2706 are formed in the predetermined location of each antenna elements 2701, 2702, and 2703, and these are connected to the electric supply terminal 2707. Here, although the direction which a tap takes showed the case of the same direction by all antenna elements, it may be set as arbitration for every antenna element.
[0092] Drawing 27 (b) shows the antenna which communalized the electrode from an electric supply terminal to the tap location of each antenna element. As shown in this drawing, taps 2704, 2705, and 2706 are formed in the predetermined location of each antenna elements 2701, 2702, and 2703, and the electrode 2708 to the electric supply terminal 2707 is common from the tap location. Thereby, a configuration not only becomes simple, but space-saving-ization is attained more by arranging this electrode 2708 in parallel with the maximum outline antenna element 2701.
[0093] Moreover, drawing 28 shows the antenna which took the tap of each antenna element through a reactive element. it is shown in drawing 28 (a) -- as -- each antenna elements 2801, 2802, and 2803 -- you may connect with the electric supply terminal 2807 through reactive elements 2804, 2805, and 2806 separately, and as shown in drawing 28 (b), a reactive element 2809 may be formed into the common electrode 2808 between the electric supply terminal 2807 and a tap location. In this case, a reactive element may be prepared between an electric supply terminal and a grounding terminal like drawing 9 mentioned above. Thus, it becomes possible by using a suitable reactive element to acquire an impedance, a desired band, and the desired maximum effectiveness. In addition, you may adjust to a reactive element using a variable reactive element.
(Gestalt 12 of operation) Drawing 29 is the mimetic diagram concerning this invention showing the

example of the antenna equipment of the gestalt of the 12th operation. Two or more antenna elements are arranged in the predetermined range near the conductor cope plate, and one antenna is constituted from an antenna element group formed into single electric supply, and it has the composition of having connected the grounding terminal and conductor cope plate of the electric supply section. As shown in drawing 29 , two or more antenna elements 2901, 2902, and 2903 were formed into single electric supply from the electric supply terminal 2907 arranged by penetrating the conductor cope plate 2909, one antenna was constituted from an antenna element group, and the grounding terminal 2908 and the conductor cope plate 2909 of the electric supply section are connected. By the above configuration, the antenna of small and high interest profit can be installed on a flat surface near the conductor cope plate.

(Gestalt 13 of operation) Drawing 30 is the mimetic diagram concerning this invention showing the example of the antenna equipment of the gestalt of the 13th operation.

[0094] Tuning frequency is controlled by setting spacing with the parts 3001 and 3002 which the opening terminal side of an antenna element counters as a predetermined distance, and controlling both association to be shown in drawing 30 (a).

[0095] Moreover, about a setup of the part 3001 which the opening terminal side of an antenna element counters, and association of 3002, as shown in drawing 30 (b), a dielectric 3003 may be formed, and as shown in drawing 30 (c), both may be connected through a reactive element 3004. At this time, it is good also as a configuration which considers a dielectric 3003 as a movable configuration, may control association and controls association by making a reactive element 3004 into variable reactance.

[0096] Moreover, in the gestalt of this operation, although that whose number of antenna elements is one was shown, like the antenna shown by above-mentioned drawing 25 , two or more things are sufficient as the number of antenna elements, and it does not restrict to this.

(Gestalt 14 of operation) Drawing 31 is the mimetic diagram concerning this invention showing the example of the antenna equipment of the gestalt of the 14th operation.

[0097] Tuning frequency is controlled by setting the distance between the parts 3111 and 3112 countered the neutral point 3103 or near the neutral point the opening terminal sides 3101 and 3102 of an antenna element as a predetermined distance to be shown in drawing 31 (a).

[0098] Moreover, about a setup of association of the part countered the neutral point or near the neutral point the opening terminal side of an antenna element, as shown in drawing 31 (b) and (c), a dielectric 3104 may be formed and both may be connected through a reactive element 3105 or 3106. At this time, it is good also as a configuration which considers a dielectric 3104 as a movable configuration, may control association and controls association by making reactive elements 3101 and 3102 into variable reactance like the gestalt of implementation of the above 13th.

[0099] Moreover, in the gestalt of this operation, although that whose number of antenna elements is one was shown, like the antenna shown by above-mentioned drawing 25 , two or more things are sufficient as the number of antenna elements, and it does not restrict to this.

(Gestalt 15 of operation) Drawing 32 is the mimetic diagram concerning this invention showing the example of the antenna equipment of the gestalt of the 15th operation. the antenna equipment of the gestalt of this operation -- the two poles of a coil -- respectively -- at least one line -- a conductor -- connecting -- the neutral point of a coil to a grounding terminal -- each -- a line -- a tap is formed from the position of a conductor or a coil, and it has composition which takes out an electric supply terminal from there. it is shown in drawing 32 (a) -- as -- a coil 3203 -- two poles -- respectively -- a line -- conductors 3201 and 3202 -- having -- the neutral point of a coil 3203 to the grounding terminal 3206 -- a line -- it is considering as the configuration which forms a tap 3204 from the position of a conductor (here 3202), and takes out the electric supply terminal 3205. Moreover, as shown in drawing 32 (b), a tap 3204 may be formed from the position of a coil 3203, and the electric supply terminal 3205 may be taken out.

[0100] A miniaturization and a broadband are realizable with the above configuration the top which

can adjust the tuning frequency of an antenna with the number of winding of a coil.
[0101] the line of plurality [drawing 33 / coil] -- the case where it has a conductor is shown. it is shown in drawing 33 (a) -- as -- the line of plurality [coil / 3307 / two poles] respectively -- conductors 3301 and 33023303, and 3304, 3305 and 3306 -- having -- the neutral point 3310 of a coil 3307 to the grounding terminal 3311 -- each -- a line -- it is considering as the configuration which forms a tap 3308 from the position of a conductor (here 3304, 3305, 3306), and takes out the electric supply terminal 3309. Moreover, as shown in drawing 33 (b), a tap 3312 may be formed from the position of a coil 3307, and the electric supply terminal 3309 may be taken out. in addition -- here -- the line of one side -- although the number of conductors showed three things, it does not restrict to this that what is necessary is just two or more.
[0102] moreover, the line which serves as an antenna element with the gestalt of this operation -- although the configuration of a conductor showed only the linear thing, with at least one or more flections or bends, the thing of a spiral configuration is sufficient as it, and it is not limited to this.
(Gestalt 16 of operation) Drawing 34 is the mimetic diagram concerning this invention showing the example of the antenna equipment of the gestalt of the 16th operation. the antenna equipment of the gestalt of this operation -- two or more lines -- what communalized the conductor has one or composition which it has two to the electric supply section through the coil. it is shown in drawing 34 -- as -- two or more lines -- the electric supply section 3411 has composition connected through coils 3409 and 3410 to the electrodes 3407 and 3408 which communalized conductors 3401, 3402, and 3403, and 3404, 3405 and 3406. A miniaturization and a broadband are realizable with the above configuration the top which can adjust the tuning frequency of an antenna with the number of winding of a coil.
(Gestalt 17 of operation) Drawing 35 is the sketch block diagram concerning this invention showing an example of the antenna equipment of the gestalt of the 17th operation. The antenna equipment of the gestalt of this operation installs the antenna plurality which consists of two or more antenna element groups within the limits of predetermined, and considers it as the configuration which performs diversity reception which chooses what has the optimal receiving situation in these antennas. For example, in drawing 35 , it is two antennas 3501 and 3502 and chooses with the diver change-over switch 3503 by which the antenna of the direction where the optimal radio wave propagation is obtained was connected to the electric supply section. Here, the number of an antenna may not be limited to two like the gestalt of this operation, and may be three or more pieces. Moreover, the classes of antenna may also be the antenna of other classes which it is not limited to the antenna of the configuration shown in drawing 35 , and was explained with the gestalt of the above-mentioned implementation, and the antennas of a different class.
[0103] Moreover, control which chooses the antenna of receiver input max from two or more antennas in the control which chooses the optimal antenna may be performed. Moreover, control which chooses the antenna of multi-pass interference level min may be performed.
[0104] Moreover, a balanced unbalance converter, a mode transducer, or an impedance converter may be connected to each antenna element electric supply section of the gestalten 1-17 of the above-mentioned implementation, or the electric supply section of the antenna which formed two or more antenna element groups into single electric supply.
(Gestalt 18 of operation) Drawing 36 is an external view explaining the installation of the antenna in the gestalt of the 18th operation concerning this invention. The gestalt of this operation explains the installation in the case of attaching an antenna in an automobile. The antenna to install is antenna equipment explained with the gestalt of each above-mentioned implementation. The installations of an antenna are the roofs 3605, such as the rear spoiler 3601, the trunk lid rear panel 3602, the rear tray 3603, the roof spoiler 3604, the roof box 3606, and a sunroof visor, as shown in drawing 36 .
[0105] Moreover, what is necessary is just to install in the pillar section 3704 to install an antenna perpendicularly, as shown in the edge 3703 grade of the both ends 3703 of the spoilers 3701 and 3702 of an automobile, or a sun visor, or drawing 37 (b) drawing 37 (a) So that it may be shown. Of

course, if it is just going to incline to some extent from a horizontal plane not only by this but by other parts of an automobile, it can install. Desired polarization can be made easy to receive by arranging in these locations.

[0106] As mentioned above, each antenna equipment of this invention can be installed, without making it project from a car body, since the contiguity arrangement of an antenna flat surface and the car-body flat surface which is a conductor cope plate can be carried out in parallel, and since occupancy area is small, it can be installed in a narrow tooth space. Therefore, an exterior fine sight improves, control of whizzing sound generating is attained, and troubles, such as removal at the time of being the danger of a theft and car washing, can be canceled further.

(Gestalt 19 of operation) Drawing 38 is the mimetic diagram showing the example of the mobile communication device equipped with the antenna equipment of the gestalt of the 19th operation concerning this invention. As shown in drawing 38 , one antenna 3801 of the gestalten of operation mentioned above is installed in the head-lining section of the car bodies 3805, such as an automobile. If an antenna 3801 is contained to the crevice 3806 formed in the head-lining section at this time, an antenna does not project from the outline of a car body 3805. The antenna 3801 is connected to the communications apparatus 3804 which consisted of amplifier 3802 carried in the car-body 3805 interior, and modulator and demodulator 3803 grade.

(Gestalt 20 of operation) Drawing 39 is the mimetic diagram showing the example of the cellular phone equipped with the antenna equipment of the gestalt of the 20th operation concerning this invention. Drawing 39 (a) is an example which has arranged the antenna 3903 on the interior side face of case 3901 so that the conductive shielding case 3902 prepared in the case 3901 interior made of the resin of a cellular phone may be used as a conductor cope plate and it may become parallel to the shielding case 3902. Moreover, drawing 39 (b) arranges an antenna 3904 in the outside upper part of the case 3901 made of the resin of a cellular phone, and is the example which formed the conductor cope plate 3905 in the interior which counters with an antenna 3904 on both sides of the case 3901. In this case, since area is usually small, the upper part of a shielding case 3902 is not used as a conductor cope plate. The antenna which uses drawing 39 (a) and (b) should just use what has many numbers or numbers of winding of the flection which can perform especially a miniaturization easily also in the antenna of the gestalt of each operation mentioned above.

[0107] The electromagnetic wave disorder to the body can be mitigated without seeing from an antenna, if such a configuration is used, and dropping antenna efficiency, if it is used by making a conductor cope plate side into a body side since the directional gain by the side of a conductor cope plate is very small.

[0108] In addition, although the gestalt of implementation of the above 18th explained the example which installs antenna equipment in an automobile, other mobiles are sufficient not only as this but an airplane, a vessel, etc. Or you may install in the wall surface of a building, an aperture, etc. further again in the road surface of traffic routes, such as not only a mobile but a highway, the road shoulder, the tariff gate, and a tunnel.

[0109] Moreover, although the gestalt of implementation of the above 19th explained the mobile communication device for antenna equipment to the example, it is available if it is equipment which receives or transmits electric waves, such as not only this but television, a radio cassette recorder, a walkie-talkie, etc.

[0110] Moreover, with the gestalt of implementation of the above 20th, although the cellular phone was explained to the example, not only this but PHS, a pocket bell, a navigation system, etc. are applicable with other walkie-talkie vessels.

(Gestalt 21 of operation) Drawing 42 is the sketch block diagram concerning this invention showing the antenna equipment of the gestalt of the 21st operation. That is, contiguity arrangement is carried out to the main antenna element 4202 by which the end was connected to touch-down 4204, and its main antenna element 4202, component length is longer than an antenna element 4202, it is a monopole type wideband antenna and it is [component length of drawing 42 (a) is shorter

than the antenna element 4201 and antenna element 4202 by which both ends are not grounded, and] antenna equipment which consisted of antenna elements 4203 by which both ends are not grounded. A tap is prepared in the main antenna elements 4202, and it connects with them through the reactive element 4205 for impedance adjustment at the feeding point 4206. Moreover, drawing 42 (b) forms the antenna elements 4201, 4202, and 4203 of the antenna equipment of above-mentioned drawing 42 (a) on a printed circuit board 4207 using a printed circuit.

[0111] Drawing 43 considers the antenna equipment of the gestalt of the above-mentioned implementation as a dipole type. That is, contiguity arrangement is carried out to the main antenna element 4302 by which the center section was connected to touch-down 4304, and its main antenna element 4302, component length is longer than an antenna element 4302, it is a dipole type wideband antenna and it is [drawing 43 R> 3 (a) has component length shorter than the antenna element 4301 and antenna element 4302 by which where is not grounded, and] antenna equipment which consisted of antenna elements 4303 by which where is not grounded. A tap is prepared in the main antenna elements 4302, and it connects with them through the reactive element 4305 for impedance adjustment at the feeding point 4306. Moreover, drawing 43 (b) forms the antenna elements 4301, 4302, and 4303 of the antenna equipment of above-mentioned drawing 43 (a) on a printed circuit board 4307 using a printed circuit.

[0112] By the above-mentioned configuration, broadband-izing, high-gain-izing, and adjustment easy-ization can be measured with an easy configuration.

[0113] In addition, although it constituted at a time the antenna element shorter than the main antenna elements which carry out contiguity arrangement, and the long antenna element in the main antenna elements from a gestalt of the above-mentioned implementation at one piece, respectively, the configuration which carried out contiguity arrangement of the two or more pieces not only in this, respectively may be used.

(Gestalt 22 of operation) Drawing 44 is the sketch block diagram concerning this invention showing the antenna equipment of the gestalt of the 22nd operation. That is, although drawing 44 (a) is similar to the antenna element explained by above-mentioned drawing 10 etc. at the antenna equipment with which contiguity arrangement of the conductor cope plate was carried out, a different point from these antenna equipment is a point that the magnitude of the conductor cope plate 4404 by which contiguity arrangement is carried out at antenna elements 4401, 4402, and 4403 is almost the same as the magnitude of the outermost antenna element 4401, or is set up smaller than it. According to such a configuration, as compared with the case where a conductor cope plate is larger than an antenna element, improvement in horizontally-polarized-wave gain can be measured.

[0114] Moreover, drawing 44 (b) shows the example which contains the antenna equipment of above-mentioned drawing 44 (a) to the crevice established in for example, the mobile body, a transmitter case, a house wall, other equipment cases, etc., and is taken as the configuration which does not connect the antenna ground (conductor cope plate) 4404 and these case ground. By this configuration, both horizontal and vertical polarization can acquire high gain. The directive gain characteristics in the vertically polarized wave of this antenna are shown in drawing 94 . Gain is high, so that 80mm and (d) are [(a) / 30mm and (c)] 150mm for 10mm and (b) and the installation distance (namely, separation) of an antenna ground and a case ground has a small installation distance. That is, its engine performance improves, so that an antenna ground and a case ground approach. Moreover, in this example, in order to make it an antenna not jump out of an outside case, the antenna ground 4404 is contained to the crevice established in the mobile body, a transmitter case, a house wall, other equipment cases, etc., but even if it takes a fixed installation distance to the flat side of a case ground and carries out contiguity installation, the effectiveness as an antenna is the same and is included in this invention also in that case.

[0115] Moreover, although considered as the configuration which used the balance type thing as an antenna element with the gestalt of this operation, the configuration which used the imbalance type

thing for the antenna element is effective similarly.
(Gestalt 23 of operation) Drawing 45 is the sketch block diagram concerning this invention showing the antenna equipment of the gestalt of the 23rd operation. It is the example which shows whether the gestalt of this operation is good to make an antenna element approach what distance when carrying out contiguity arrangement of the conductor cope plate, and drawing 45 (a) is an example in case the number of antenna elements is one. That is, the distance h of an antenna element 4501 (correctly antenna ground connection section) and the conductor cope plate 4502 is set as the 0.01 to 0.25 times (namely, 0.01lambda-0.25lambda) as many range as this to the wavelength lambda in the resonance frequency f of an antenna. High-gain-izing and easy-ization of adjustment can be measured by this configuration.
[0116] Moreover, drawing 45 (b) shows the case where the number of antenna elements is four, and antenna elements 4503, 4504, 4505, and 4506 are arranged at distance which is different from the conductor cope plate 4507, respectively. As shown in drawing 45 (b), when component length differs, respectively, the resonance frequency of the antenna element becomes high, and its wavelength is so short that component length is short. Therefore, component length sets up smallest the distance h1 of the shortest antenna element 4506, the distance h2 of the longest antenna element 4503 of component length is set up most greatly, and the distance of the middle antenna elements 4504 and 4505 should just set up distance according to the wavelength in the resonance frequency of each antenna element, respectively. In that case, to each wavelength in the resonance frequency of each antenna element, as mentioned above, the distance of each antenna elements 4503, 4504, 4505, and 4506 and the conductor cope plate 4507 is set up so that the conditions of being 0.01 to 0.25 times (namely, 0.01lambda-0.25lambda) many as this may be satisfied.
(Gestalt 24 of operation) Drawing 46 is the sketch block diagram concerning this invention showing the antenna equipment of the gestalt of the 24th operation. With the gestalt of this operation, high dielectric constant material is prepared between an antenna element 4601 and the conductor cope plate 4602. Therefore, a conductor cope plate is applicable to an antenna element among the antenna equipment mentioned above to the thing of the configuration of the gestalt of the operation which carries out contiguity arrangement. Here, distance between an antenna element and a conductor cope plate can be made small equivalent by preparing high dielectric constant material between an antenna element and a conductor cope plate.
(Gestalt 25 of operation) Drawing 47 is the external view showing the example of application to the car body in the antenna equipment of the gestalt of the 25th operation concerning this invention. That is, it considers as a diversity configuration by these flat antennas by installing one antenna equipment of the gestalten of operation of this invention mentioned above in five places by four places of the car-body pillar section 4701 of front and rear, right and left of an automobile, and one all of the roof section. Good transmission and reception are attained to level perpendicular both polarization by this configuration. Here, although the installation part of an antenna was made into five places, an installation part is not limited to this.
(Gestalt 26 of operation) Drawing 48 is the external view showing the example of application to each part of a car body of the installation part of the antenna equipment in the gestalt of the 26th operation concerning this invention. That is, one antenna equipment of the gestalten of operation of this invention mentioned above is attached in one of the locations which can install car-body 4801 front faces, such as the roof panel of the car body 4801 of an automobile, a bonnet, the car-body pillar section, a car-body side face, a bumper, a tire wheel, and a floor, or two or more locations. In drawing 48 , it is installed in the location where an antenna 4802 becomes almost level [an antenna flat surface], and it is a thing and an antenna 4804 is installed in the location where an antenna 4803 becomes an antenna flat surface is installed in the location to which it inclines aslant, and almost perpendicular [an antenna flat surface]. Drawing does not need to show a location suitable as an installation of an antenna, and does not need to install all. Moreover, it is easy to be natural even if it installs in other locations except having been shown in drawing. Moreover, it is not limited

to a passenger car [like drawing] whose class of vehicle is also, and is possible also by vehicles, such as a bus and a truck.
[0117] In addition, it is installed so that an antenna flat surface may become level, but the antenna 4805 is installed especially in the background (below) of a floor, and since directional characteristics are suitable in the direction of a road surface, it fits the communication link with the radio source (or embedded) installed in in the road [path] it used for a communication link, detection of a car body's existence location, etc.
[0118] Usually, the electric wave of TV or FM broadcasting is an electric wave which is mainly concerned with a horizontally polarized wave, and the electric wave of a cellular phone, wireless radios, etc. is an electric wave which is mainly concerned with a vertically polarized wave, and it is decided [or or] by the installation direction of an antenna whether to carry out vertically-polarized-wave **** suitable for a horizontally polarized wave. Since it is installed in parallel with the field of the conductor cope plate 4901 of the perpendicular field which is a part of car body 4801, and electric field become level with three antennas 4902 of the imbalance type to which the ground edge was connected as shown in the right figure and sensibility can be made high to a horizontally polarized wave as shown in drawing 49 (a), it is effective as an antenna for horizontally polarized waves. This is realizable by installing in the location shown with the antenna 4804 of drawing 48 . Moreover, since it is the antenna installed in parallel with the level field of a car body 4801, since the electric field become perpendicular and serve as high sensitivity to a vertically polarized wave, they are effective as an antenna for vertically polarized waves. [of an antenna 4802] Furthermore, it is the antenna inclined and installed in the direction of slant, and an antenna 4803 has the sensibility which maintained balance with a horizontally polarized wave and a vertically polarized wave according to the inclination degree, it is seldom influenced in the direction of polarization, but can use it for it. Drawing 49 (b) is drawing showing the example of a balance type antenna, and is effective as an antenna for horizontally polarized waves like the above-mentioned in this case.
(Gestalt 27 of operation) Drawing 50 is the mimetic diagram showing the configuration of the antenna equipment in the gestalt of the 27th operation concerning this invention. The point that the antenna equipment of the gestalt of this operation differs from the antenna equipment to the above-mentioned is a point that the direction which an electric wave sends and receives is a conductor cope plate [not an antenna element but] side. As shown in drawing 50 (a), three antennas 5002 are arranged at the predetermined spacing in parallel with the conductor cope plate 5001, the ground edge of the antenna 5002 is connected to the conductor cope plate 5001, and it considers as the configuration the conductor cope plate 5001 side turned [configuration] to the outside. This antenna has a directive object property in the bottom to the antenna 5002 in drawing 50 (b) with the field bottom (it is the opposite side in an antenna 5002) of the conductor cope plate 5001 corresponding to a wrap field in the 5002nd page of an antenna. Therefore, even if opposite to the conventional arrangement, the orientation of an antenna 5002 and the conductor cope plate 5001 As the same effectiveness as the antenna of the gestalt of operation explained until now can be acquired and it is further shown in drawing 50 (c) Even if it is the case configuration by which the conductor cope plate 5003 was blockaded, there is same property, and even if it supplies electric power to the antenna 5002 of the conductor cope plate 5003 interior, it can communicate to the exterior through the conductor cope plate 5003.
[0119] To drawing 50 being imbalance type antenna equipment, drawing 51 is the example which made this balance type antenna equipment, and has the same effectiveness as the above-mentioned.
[0120] Moreover, drawing 52 is drawing showing the example which applied the antenna equipment in the gestalt of this operation to each location of the same car body as drawing 48 . In drawing 52 , like drawing 48 , an antenna 5202 is installed in the location where an antenna flat surface becomes almost level, it is a thing and an antenna 5204 is installed in the location where an antenna flat

surface is installed in the location to which it inclines aslant, and an antenna 5203 becomes almost perpendicular [an antenna flat surface]. Moreover, although an antenna 5205 is installed so that an antenna flat surface may become level, it is installed especially inside the floor and fits the communication link with the radio source installed in a path on the street like the case of drawing 48 . Although all of these antennas are arranged inside the car body 5201, since the same engine performance as the case where it installs in a car-body front face for the reason mentioned above can be realized and an antenna is not exposed to the car-body exterior, they are very advantageous from points, such as a fine sight, damage, and a theft. Furthermore, as shown in drawing 52 , a reflector glass, an indoor sun visor, or a number plate can be installed also in the location which cannot usually be attached outside using the interior.

[0121] Drawing 53 is the external view showing the example of application to the cellular phone of the antenna equipment in the gestalt of this operation, and is the configuration of having installed the antenna 5302 inside the ground tank 5301 of a conductor, and having connected the antenna ground to the ground tank 5301. While being able to use it like the case where an antenna is formed in the outside of the ground tank 5301, by this configuration, since an antenna is not outside exposed, it is dealt with, and is advantageous a top. Here, although the cellular phone was explained to the example, it is applicable to TV, PHS, other wireless devices, etc.

[0122] Drawing 54 is the external view showing the example of application to the common house of the antenna equipment in the gestalt of this operation. That is, an antenna 5402 is installed inside the door of the conductor of a house 5401, an antenna 5403 is installed inside the aperture (for example, sliding shutter) of a conductor, an antenna 5404 is installed inside the wall of a conductor and the antenna 5405 is installed inside the roof of a conductor. Thus, if an antenna is installed using the inside of the structure which is the conductor of a house 5401, since an antenna will not be outside exposed, the damage and degradation by the rainstorm can be prevented and it leads to reinforcement.

[0123] In addition, also in the case of the structure whose house is not a conductor, if only the location in which an antenna is installed attaches a conductor outside, it can install easily.

(Gestalt 28 of operation) Drawing 55 is the mimetic diagram showing the configuration of the antenna equipment in the gestalt of the 28th operation concerning this invention. The gestalt of this operation considers the conductor cope plate 5501 and the antenna 5502 installed by approaching in parallel with it as the configuration which can be rotated centering on the shaft shown in coincidence with an alternate long and short dash line (or rotation is sufficient). It becomes [as opposed to / since it becomes / as opposed to / since electric field become level like drawing 55 (a) as / in a condition with a perpendicular antenna 5502 / shown in the right figure / a horizontally polarized wave / high sensitivity, and electric field become perpendicular as / in a condition with a level antenna 5502 / shown in this drawing (b), and shown in the right figure / a vertically polarized wave] high sensitivity, and an antenna can be adjusted to the optimal sense according to the condition of polarization. Of course, you may set it as the condition of having inclined aslant. The directive gain characteristics in the installation condition of drawing 55 (a) are shown in drawing 95 , and the directive gain characteristics in the installation condition of drawing 55 (b) are shown in drawing 96 . It turns out that an antenna becomes high sensitivity to a horizontally polarized wave in the perpendicular condition, and the antenna has become high sensitivity to a vertically polarized wave in the level condition so that clearly from both [these] drawings.

[0124] Here, as an approach of rotating the conductor cope plate 5501 and an antenna 5502, it is good also as manual system which turns a handle by hand, and good also as automatic system using driving gears, such as a motor.

[0125] Drawing 56 (a) is drawing showing the configuration of the antenna equipment for realizing the above-mentioned effectiveness, without rotating an antenna. That is, it considers as the configuration which has arranged the ferroelectric 5603 so that an antenna 5602 may be inserted between the conductor cope plate 5601 and an antenna 5602. Since the electric field between the

conductor cope plate 5604 and an antenna 5605 can extend horizontally through a ferroelectric 5606 by this configuration as shown in the right figure of drawing 56 (b), as compared with the case where there is no ferroelectric of the left figure, a vertical component becomes small and a horizontal component becomes large. Thus, according to the existence of a ferroelectric, an antenna can be set to the object for vertically polarized waves, or horizontally polarized waves. In addition, when the antenna is installed in the perpendicular condition, it becomes contrary to the above. Although this ferroelectric 5603 may prepare two kinds such as what was attached at the time of manufacture, and the thing which is not attached, it prepares the slot for desorption etc. and is simply good also as a configuration in which desorption is possible.

(Gestalt 29 of operation) Drawing 57 is the mimetic diagram showing the example of the configuration of the antenna equipment in the gestalt of the 29th operation concerning this invention. Although the element which the antenna equipment of the gestalt of operation to the above-mentioned bent so that an installation tooth space could be made small was used, the element of a straight-line configuration or the element of the configuration doubled so that the configuration of a configuration member might be met is used so that the gestalt of this operation can be installed in the long and slender configuration member attached in the automobile etc.

[0126] Drawing 57 (a) is the example which carried out contiguity arrangement of the antenna 5702 of the shape of three straight line on the front face of the long and slender tabular conductor cope plate 5701. This drawing (b) is the example which carried out contiguity arrangement of the antenna 5704 of the shape of three straight line on the front face of the conductor cope plate 5703 of a pipe configuration so that each element might serve as the equal distance from the conductor cope plate 5703. This drawing (c) is the example which carried out contiguity arrangement of the antenna 5706 of the shape of three straight line on the front face of the conductor cope plate 5705 of the shape of a square cartridge so that each element might become the equal distance from the conductor cope plate 5705.

[0127] Moreover, drawing 58 is the example of drawing 57 , although the configuration of a conductor cope plate curved or bent, it is drawing showing the example which met the configuration, and curved or bent the element to the case, and drawing 58 (a) is the example which carried out contiguity arrangement of the three antennas 5802 which curved like the front face of the conductor cope plate 5801 of the curved pipe configuration so that each element might become the equal distance from the conductor cope plate 5801. This drawing (b) is the example which carried out contiguity arrangement of the three antennas 5804 which bent like the front face of the conductor cope plate 5803 of the shape of a square cartridge which bent on the way so that each element might become the equal distance from the conductor cope plate 5803. This drawing (c) is the example which carried out contiguity arrangement of the three antennas 5806 which bent like the front face of the tabular conductor cope plate 5805 which bent on the way.

[0128] Moreover, drawing 59 (a) shows the example of the antenna 5902 installed along the perimeter of the front face of the cylinder-like conductor cope plate 5901, and this drawing (b) shows the example of the antenna 5904 installed along the perimeter of the front face of the spherical conductor cope plate 5903.

[0129] In addition, although the gestalt of this operation explained the case where an antenna was installed in the outside of the configuration member which is a conductor cope plate, it is good also as a configuration which installs an antenna in the interior, such as the inside of not only this but plate-like part material, and a cartridge-like member.

[0130] Drawing 63 and drawing 65 are drawings showing the example of application of the antenna equipment in the gestalt of this operation. Drawing 63 shows the example which installed the antenna 6302 in the front face of the long and slender roof rail 6303 on the roof of a car body 6301, and drawing 65 shows the example which installed the antenna 6502 in the interior of the long and slender roof rail 6503 on the roof of a car body 6501.

[0131] Moreover, drawing 64 and drawing 66 are also drawings showing the example of application of

the antenna equipment in the gestalt of this operation. Drawing 64 shows the example which installed the antenna 6403 in the front face of the long and slender roof box 6402 on the roof of a car body 6401, and drawing 6666 shows the example which installed the antenna 6603 in the interior of the long and slender roof box 6602 on the roof of a car body 6601.
(Gestalt 30 of operation) Drawing 60 (a) and (b) are the mimetic diagrams showing the example of the configuration of the antenna equipment in the gestalt of the 30th operation concerning this invention. In the configuration in which it has three antennas 6002 with long element duration, and three antennas 6003 with short element duration relatively, the feeding points A6005 and B6004 are formed in each of these antennas 6002 and 6003 to the ground edge where the antenna equipment of the gestalt of this operation was connected to the conductor cope plate 6001. As shown in drawing 60 (c), the antenna 6003 of the shorter one is relatively aligned with a band A band with a high frequency, and the antenna 6002 of the longer one will be relatively aligned with a band B band with a low frequency, and can realize the antenna which can respond to two alignment bands with one antenna. In addition, the feeding points A6005 and B6004 may be connected mutually.
[0132] Drawing 61 (a) and (b) are the examples of the antenna which has two alignment bands with an imbalance type antenna. The end was connected to the conductor cope plate 6101, and this antenna is an antenna which consists of four elements arranged by approaching that conductor cope plate 6101, set the feeding point B6104 as two antennas 6102 with long element duration relatively among four elements, and has set the feeding point A6105 as two antennas 6103 with short element duration relatively. As this configuration shows to drawing 61 (c) like the above-mentioned, it can respond to two alignment bands, A band with a high frequency, and B band with a low frequency. In addition, the feeding points A6005 and B6004 may be connected mutually.
[0133] Drawing 62 (a) and (b) are the examples of the antenna which has two alignment bands with a balance type antenna. The center point was connected to the conductor cope plate 6201, and this antenna is an antenna which consists of four elements arranged by approaching that conductor cope plate 6201, set the feeding point B6204 as two antennas 6202 with long element duration relatively among four elements, and has set the feeding point A6205 as two antennas 6203 with short element duration relatively. As this configuration shows to drawing 62 (c) like the above-mentioned, it can respond to two alignment bands, A band with a high frequency, and B band with a low frequency. In addition, the feeding points A6005 and B6004 may be connected mutually.
[0134] Thus, since the powerful antenna equipment which stops the installation tooth space of antenna equipment to the minimum, and can respond to two or more alignment bands can be offered according to the gestalt of this operation, it is applicable also to narrow locations, such as an automobile and a cellular phone.
[0135] In addition, although the alignment band was set to two, you may constitute from a gestalt of this operation so that it can respond not only to this but to three bands or more. In that case, what is necessary is to form two or more antennas which have the element duration corresponding to each alignment band, and just to set the feeding point as each antenna.
(Gestalt 31 of operation) Drawing 67 is the sketch block diagram concerning this invention showing an example of the antenna equipment of the gestalt of the 31st operation. A coil 6703 is inserted in the middle of the horseshoe-shaped antenna element 6701 prepared by approaching the conductor cope plate 6702, and the antenna equipment of the gestalt of this operation has the composition that the end of an antenna element 6701 was connected to the conductor cope plate 6702. Moreover, the electric supply section 6704 is formed in the middle of the antenna element 6701 between a coil 6703 and the conductor cope plate 6702. According to this configuration, a current will concentrate on a coil, and gain is eternal and can miniaturize antenna equipment. For example, if the part of an antenna element is constituted from the strip line, the area of an antenna will become small with one fourth. Moreover, bandwidth becomes narrow and a band property becomes sharp.
[0136] Moreover, drawing 68 connects the antenna element of the configuration of drawing 67 to 2 juxtaposition, and carries out band composition. That is, the antenna elements 6801a and 6801b

from which two bands (die length) where Coils 6803a and 6803b were inserted in the middle of the component, respectively differ are arranged at juxtaposition, each end is connected to the conductor cope plate 6802, and common connection of each antenna elements 6801a and 6801b is made through reactive elements 6805a and 6805b at the electric supply section 6804, respectively. By this configuration, the band of two antenna elements can be compounded and, in addition to the above-mentioned effectiveness, antenna equipment can be broadband-ized.
(Gestalt 32 of operation) Drawing 69 is the sketch block diagram concerning this invention showing an example of the antenna equipment of the gestalt of the 32nd operation. A coil 6903 is inserted between the ends of the horseshoe-shaped antenna element 6901 and the conductor cope plates 6902 which were formed by approaching the conductor cope plate 6902, and the antenna equipment of the gestalt of this operation has the composition that the other end of the coil 6903 was grounded by the conductor cope plate 6902. Moreover, the electric supply section 6904 is formed in the middle of the antenna element 6901. According to this configuration, a current will concentrate on a coil like the gestalt of the 32nd operation of the above-mentioned, and gain is eternal and can miniaturize antenna equipment.
[0137] Moreover, drawing 70 connects the antenna element of the configuration of drawing 69 to 2 juxtaposition, and carries out band composition. That is, the antenna elements 7001a and 7001b from which two bands (die length) differ are arranged at juxtaposition, common connection of each end is made at the end of a coil 7003, and the other end of the coil 7003 is connected to the conductor cope plate 7002. Moreover, common connection of each antenna elements 7001a and 7001b is made through reactive elements 7005a and 7005b at the electric supply section 7004, respectively. By this configuration, the band of two antenna elements can be compounded and, in addition to the above-mentioned effectiveness, antenna equipment can be broadband-ized. Moreover, since the coil is communalized by two antenna elements, as for a coil, a configuration becomes easy well at one piece.
(Gestalt 33 of operation) Drawing 71 is the mimetic diagram concerning this invention showing the example of the antenna equipment of the gestalt of the 33rd operation. The point that the gestalt of this operation differs from the gestalt of implementation of the above 32nd is a point of having formed the insulator 7105 on the conductor cope plate 7102, and having connected the antenna element 7101 and the coil 7103 on the insulator 7105, as shown in drawing 7171 . It is convenient for installation of a coil 7103 to become easy and to mount by this configuration, and a coil can be installed in stability. Moreover, although drawing 72 R> 2 is the example of a configuration of performing band composition by two antenna elements 7201a and 7201b, the number of an antenna element increases and connection with a coil 7203 becomes complicated, since the node is prepared on the insulator 7205 on the conductor cope plate 7202, connection between an antenna element and a coil becomes still easier.
(Gestalt 34 of operation) Drawing 73 is the mimetic diagram concerning this invention showing the example of the antenna equipment of the gestalt of the 34th operation. The antenna equipment of the gestalt of this operation has connected the antenna element, the coil, etc. using two insulators 7305a and 7305b formed on the conductor cope plate 7302 while dividing a coil part into two. That is, it is the configuration of having connected the end of the horseshoe-shaped antenna element 7301 and the end of coil 7303a which were prepared by approaching the conductor cope plate 7302 on insulator 7305a, having connected the other end of the coil 7303a, another end of coil 7303b, and the electric supply section 7304 on [another] insulator 7305b, and having grounded the other end of coil 7303b to the conductor cope plate 7302. Moreover, drawing 74 is antenna equipment for band composition which used two antenna elements 7401a and 7401b, and connects an antenna element, a coil, and the electric supply section like drawing 73 .
[0138] According to these configurations, since the terminal of the electric supply section is prepared on the circuit board, connection with other passive circuit elements becomes easy.
(Gestalt 35 of operation) Drawing 75 is the mimetic diagram showing the example of the

configuration of the antenna in the gestalt of the 35th operation concerning this invention. The antenna equipment of the gestalt of this operation is the configuration which inserted the zigzag-like pattern 7503 in the antenna element 7501 instead of the coil in the configuration of drawing 67 . Although a configuration spreads in three dimension with the configuration using a coil, if this pattern 7503 is used, it can form on the same flat surface as an antenna element 7501, and the printed-circuit approach etc. will become producible therefore. Moreover, drawing 76 shows the band compositive type which used two antenna elements 7601a and 7601b, and inserts the zigzag-like patterns 7603a and 7603b in each of each antenna elements 7601a and 7601b. In addition, this pattern may be a pattern of the shape of a saw wave as shown in drawing 78 (c) etc.

(Gestalt 36 of operation) Drawing 77 is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 36th operation concerning this invention. The antenna equipment of the gestalt of this operation is the configuration of having formed in the zigzag-like pattern the antenna element 7701 whole arranged by approaching the conductor cope plate 7702, and having connected to the end of the antenna element 7701 the other end of the coil 7703 with which the end was grounded. The electric supply section 7704 is formed in the middle of the zigzag-like antenna element. According to this configuration, although loss increases, antenna equipment can be further miniaturized with one sixth or 1/8. Moreover, a pattern configuration as shown in (b) of drawing 78 and (c) in addition to this is sufficient as the configuration of an antenna element. Drawing (b) is what [a thing / three dimension / coiled form].

(Gestalt 37 of operation) Drawing 79 is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 37th operation concerning this invention. The antenna equipment of the gestalt of this operation forms an insulator 7904 on the conductor cope plate 7902, and connects the lead wire 7905 and the electric supply section 7903 which were pulled out from the antenna element 7901 on this insulator 7904. By this configuration, since the electric supply section 7903 is formed on the circuit board, connection with other passive circuit elements becomes easy.

[0139] Moreover, for the side by which a through tube 8005 is formed in the conductor cope plate 8002, and an antenna element 8001 exists in it, drawing 80 is the configuration of having formed the insulator 8004 on the conductor cope plate 8002 of the opposite side. And the electric supply section 8003 is connected to a through tube 8005 and an insulator 8004 on an insulator 8004 through the lead wire 8006 pulled out from the antenna element 8001. Thereby, since passive circuit elements are connectable on the background of the conductor cope plate 8002, the handling of other passive circuit elements linked to the electric supply section 8003 becomes convenient further from the configuration of above-mentioned drawing 79 .

[0140] Moreover, in the configuration of above-mentioned drawing 80 , drawing 81 forms another conductor plate in the rear face (an antenna element is an opposite side) of a conductor cope plate, and mounts various kinds of passive circuit elements in the conductor plate. That is, the through tube 8104 which lets the lead wire 8111 pulled out from the antenna element 8101 pass is formed in the conductor cope plate 8102 and the conductor plate 8105, and an insulator 8103 is formed in them at the conductor plate 8105 side of the through tube 8104. Moreover, only a required number forms the insulator 8106 for connecting various kinds of passive circuit elements in the front face of the conductor plate 8105. And lead wire 8111 is connected to an insulator 8103 through a through tube 8104, and passive circuit elements 8107-8110 are connected to an insulator 8103 or 8106 top each.

[0141] According to this configuration, a circuit can be arranged immediately near the antenna, shielding of an antenna and a circuit can also be easily performed using a conductor plate, and it is effective in the miniaturization of a device.

[0142] Moreover, drawing 82 is the example of a configuration of having arranged passive circuit elements to the antenna element side. That is, only a required number forms the insulator 8206 for connecting the insulator 8203 for connecting the lead wire 8205 pulled out from the antenna

element 8201, and various kinds of passive circuit elements on the conductor cope plate 8202. Furthermore, the shielding case 8204 of a conductor is established on the conductor cope plate 8202 so that between an antenna element 8201 and the conductor cope plates 8202 can be **** (ed), and the through tube 8207 which lets lead wire 8205 pass is formed. And lead wire 8205 is connected on an insulator 8203 through a through tube 8207, and passive circuit elements 8208-8210 are connected to an insulator 8203 and 8206 top each. Moreover, the end of an antenna element 8201 is grounded to a shielding case 8204.

[0143] According to this configuration, although a circuit is settled between an antenna element and a conductor cope plate, it is shielded with a shielding case and can miniaturize a device further rather than the case of above-mentioned drawing 81 .

(Gestalt 38 of operation) Drawing 83 is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 38th operation concerning this invention. The antenna equipment of the gestalt of this operation carries out pattern formation of the antenna element 8301 to one front face of the insulator plate 8305, the end section 8307 of the antenna element 8301 makes the insulator plate 8305 penetrate, and the lead wire 8303 which penetrates the insulator plate 8305 is pulled out from the middle of an antenna element 8301, the lead wire 8306 which carried out pattern formation to the antenna element 8305 in parallel in the opposite side of the insulator plate 8305 is connected to the lead wire 8303, and the electric supply section 8304 is connected to the lead wire 8306. Here, the electric supply section 8304 is formed in the location close to the end section 8307 of an antenna element 8301. And the insulator plate 8305 and the conductor cope plate 8302 are arranged in parallel, and the end section 8307 of an antenna element 8301 is connected to the conductor cope plate 8302.

[0144] According to such a configuration, since the touch-down part and the electric supply section of an antenna element approach, it is convenient when connecting a coaxial cable.

[0145] (Gestalt 39 of operation) Drawing 84 is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 39th operation concerning this invention. The antenna equipment of the gestalt of this operation forms another conductor cope plate 8404 through the insulator plate 8405 on the large conductor cope plate 8402, approaches the conductor cope plate 8404, and arranges an antenna element 8401. Here, the end of an antenna element 8401 is grounded to the conductor cope plate 8404. Moreover, the magnitude of the conductor cope plate 8404 is good to make it the area and the EQC of an antenna element 8401. The conductor cope plate 8402 may be mentioned and, specifically, its whichever vehicle indoor or vehicle outdoor in the installation approach is sufficient as the body of an automobile or an electric car, the metal casing section of a receiver or a transmitter, the metal structured division of a house, etc.

[0146] According to such a configuration, an elevation angle with the maximum gain is suitable to the electric wave for a communication link (vertically polarized wave) to which it comes from width by becoming near horizontally.

[0147] In addition, it cannot be overemphasized that it can be used also about the antenna equipment of the gestalt of operation from the above 31st to the 39th, being able to install in a location which was explained in drawing 36 , 47, 48, 52 and 53, and 54 grades.

[0148] Moreover, although the number of an antenna element explained as 1 or 2 with the gestalt of operation from the above 31st to the 39th, it is easy to be natural even if the number of not only this but an antenna element is the configuration of three or more.

[0149] Moreover, although the gestalt of operation from the above 31st to the 39th explained the configuration of an antenna element as horseshoe-shaped, you may be other configurations, such as not only this but the shape for example, of a loop formation.

[0150] Moreover, the configuration which prepares a node using the insulator shown in the gestalt of operation from the above 37th to the 39th is applicable to all the antenna equipments of the gestalt of other operations mentioned above.

(2) Next, explain focusing on parts other than an antenna of the digital television broadcast receiving

set concerning this invention.
[0151] (Gestalt 40 of operation) Drawing 97 is the block diagram showing the configuration of the digital television broadcast receiving set by the gestalt 40 of operation of this invention. drawing 97 -- setting -- 9001 -- an input means and 9002 -- for a receiving means and 9005, as for a delay wave presumption means and 9008, a recovery means and 9007 are [a delay means and 9003 / a synthetic means and 9004 / a positional information judging means and 9009] car information detection means. According to drawing 97 , reception actuation of the digital television broadcast by the mobile is explained.
[0152] By the input means 9001, such as a receiving antenna, the electric wave of television broadcasting is transformed into an electrical signal, and is transmitted to the delay means 9002 and the synthetic means 9003. By the delay means 9002, the signal of the television broadcasting changed into the electrical signal is delayed according to the delay control signal from the synthetic control means 9006, and is transmitted to the synthetic means 9003. In the synthetic means 9003, according to the synthetic control signal from the synthetic control means 9006, gain (gain) is given and compounded to each of the signal acquired from the signal and the delay means 9002 which were acquired from the input means 9001, and it transmits to the receiving means 9004. It is possible to use easy actuation of addition, highest selection, etc. as synthetic technique here.
[0153] With the receiving means 9004, from the signal from the synthetic means 9003, only the signal of a required frequency band is extracted, and it changes into the signal of the frequency which can be processed with the recovery means 9005, and transmits to the recovery means 9005, and a signal is restored to it and outputted with the recovery means 9005. On the other hand, the recovery means 9005 transmits recovery information to the delay wave presumption means 9007, and presumes the delay wave contained in the received wave based on the recovery information acquired from the recovery means 9005 with the delay wave presumption means 9007.
[0154] The approach of a recovery and delay wave presumption is explained here. In ground digital broadcasting of Japan to which current and the standardization activities of a broadcasting format are given, OFDM (orthogonal frequency division multiplex method) is used as a modulation technique, an OFDM recovery is performed in the recovery means 9005, and processing which decodes the transmitted sign is performed. In order to perform the frequency analysis using FFT etc. in this decode process and to restore to data, various pilot signals are included in the signal, and it is possible to presume the transfer characteristics of a signal using those pilot signals. For example, by detecting the DIP location and the number of DIPs of a frequency component of the result in which the frequency analysis was carried out by FFT, a time delay is detectable.
[0155] When drawing 103 shows the example of the frequency analysis in OFDM and a delay wave does not exist, frequency characteristics serve as a flat, but when a delay wave exists, as shown in drawing 103 , a DIP exists in some frequency components. Moreover, it is possible to detect a delay wave by observing signal change of a pilot signal and lack of a pilot signal. Moreover, it is also possible to acquire data positional information with an error from the error correction processing after FFT processing, and to presume the time delay of an interference based on it. In addition, although the above explanation explained the digital broadcasting format of Japan, it cannot be overemphasized that it can apply not only about this but about analog broadcasting and digital broadcasting of each country.
[0156] Next, composition and control of delay are explained. In the synthetic control means 9006, the signal for controlling the delay means 9002 and the synthetic means 9003 is outputted based on the delay wave information presumed with the delay wave presumption means 9007. The case where it has the gain control means 9061 and the time delay control means 9062 by the example of 1 configuration of the synthetic control means 9006 is explained. In the gain control means 9061, the synthetic gain in the synthetic means 9003 is set up based on the delay wave information acquired from the delay wave presumption means 9007. It explains using drawing 104 as this setting approach. The axis of abscissa of drawing 104 shall show the magnitude of a delay wave, and an axis

of ordinate shall show the ratio (= signal A gain / signal B gain) of the gain (signal A gain) of the signal from the input means 9001, and the gain (signal B gain) of the signal from the delay means 9002. It controls so that both gain makes small the signal from the gain or the input means of a signal from a delay means, establishes a gain difference, so that it may become the same, and when delay wave level is larger than direct wave level when delay wave level is small or and delay wave level compounds, when large especially a direct wave and level are comparable. Furthermore, in performing gain control based on the time delay of the delay wave obtained from the delay wave presumption means 9007, it controls by the case (a in drawing 104) where a time delay is large, and the case (b in drawing 104) of being small so that the one where a time delay is larger enlarges a gain difference, as shown in drawing.

[0157] Next, actuation of the time delay control means 9062 is explained. A setup of a time delay which should be delayed with the delay means 9002 is controlled to delay the almost same time amount as the time delay presumed with the delay wave presumption means 9007 with the delay means 9002. Since it may get worse rapidly when a time delay is small (B point: about 2.5 or less microseconds) as shown in drawing 105 , the relation of the error rate of the recovery signal at this time, for example, a delay wave, can avoid aggravation of an error rate effectively by setting up not the found time delay but the time delay of immobilization, for example, the time delay more than the B point of drawing 105 , when the time delay found with the delay wave presumption means 9007 is small. However, it is necessary to make shorter than the guard period added to an OFDM signal the upper limit of the time delay given here. Moreover, in order to prevent aggravation of the error rate by the small delay wave of such a time delay occurring in advance, it is also possible to always set up the time delay decided in the delay means 9002. If one twice [about] the value of a B point is set up as the set point in this case, the effect of a certainly short time delay can be removed. Moreover, as shown in drawing 97 , when a signal is acquired from one antenna, it is possible to give and add a time delay smaller than the inverse number of the bandwidth of an input signal to a signal, to reduce the noise level of an input signal, and to improve an error rate. This is because the DIP location generated with the added signal is made out of signal bandwidth. For example, if signal bandwidth is 500kHz, it is necessary to set the time delay to give to 2 or less microseconds. In the narrow-band broadcast especially used as service broadcast for migration reception, since the approach of adding the signal which gave the above-mentioned short time delay is effective in raising the receiving level of a signal band, it is an effective means.

[0158] Next, how to use the car information detection means 9009 is explained. The car information detection means 9009 detects the information on the car which is carrying out migration reception. For example, detection of the car rate which is performing migration reception in the rate (vehicle speed) detection means 9091, and the configuration which detects a location in the location detection means 9092 can be considered. To say nothing of the ability to use navigation equipment as a car information detection means 9009, as location detection equipment, location detection according [and] to road traffic control systems, such as use of GPS equipment or PHS, a cellular phone, or VICS, etc. is available. The detected car information is transmitted to the positional information judging means 9008.

[0159] With the positional information judging means 9008, it investigates from what broadcasting station an electric wave may be received in the received location, and the time delay in a receiving point or the strength of an electric wave is presumed in consideration of reflection by the distance or the crest from those broadcasting stations, a building, etc. For that, beforehand with information, such as a location of sending stations, such as a broadcasting station or a relay center, to the frequency sent and a sending station, or a transmitting output, it downloads by means of communications, such as broadcast or a telephone, memorizes, and asks as compared with the positional information from the car information detection means 9009. Thereby, it can ask for the delay wave time amount in a receiving point, and magnitude.

[0160] Furthermore, information, such as a location of the building around a receiving point,

magnitude, and height, can be shown in a map with a broadcasting station location, and delay wave time amount and magnitude can be more correctly known by taking reflection by these etc. into consideration. It cannot be overemphasized that systems, such as navigation, can be used as equipment treating the information on these transmitting stations, a building, a crest, etc. Moreover, since the delay wave which appears in a degree since the speed detection means 9091 shows the rate of migration reception can be predicted, it becomes possible to follow a delay wave early more.
[0161] In the synthetic control means 6, synthetic gain control and time delay control are performed based on the delay wave information searched for with the positional information judging means 9008 as mentioned above. It can carry out like the time of using the delay wave information by the delay wave presumption means 9007 as the control approach in this case. It is possible to control based on the large information on present condition maintenance or delay wave level, when also using it combining the information on the delay wave presumption means 9007 and the positional information presumption means 8 furthermore, it being possible, and also performing gain and time delay control only when two delay information's is near in this case, or two delay information are separated. Although the above-mentioned explanation has explained the case where establish the car information detection means 9009 and migration reception is carried out, it is also possible to use it by migration reception and fixed reception only using the location detection means 9092.
[0162] Although [the above explanation] it is about the configuration at the time of setting the input means by the configuration of drawing 97 to one, the configuration in drawing 98 which establishes the delay means according to two or more input means and each input means is also a configuration effective in migration reception. In this case, with each input means, since the conditions of multi-pass interference differ when the same broadcasting electric-wave is received, an input signal different, respectively is acquired and it generates in the location where the location (frequency) and the depth of a DIP as this showed in drawing 103 are different, respectively. Therefore, the signal with which a DIP location differs from the depth of a DIP by applying the input signal with which plurality differs is acquired, and it becomes possible to lower the error rate of a signal as a result. The reception actuation in drawing 98 is almost equivalent to the actuation stated by drawing 97 . It is realizable because give suitably like and the found time delay performs a setup of gain as control of the delay means 9002 and the synthetic means 9003 according to the delayed signal which is set up relatively with the delay means N from the delay means 1. Moreover, when installation location spacing of two or more antennas is shorter enough than the wavelength of baseband, a received signal level can be improved by adding two or more input signals in a baseband band.
[0163] As mentioned above, according to the digital television broadcast receiving set in the gestalt 40 of operation, it is effective in the ability to mitigate a DIP of a signal by compounding a signal and, improve the error rate of digital data as a result. Moreover, degradation of an error rate can be prevented by setting up a setup of a time delay so that the effect of the short signal of a time delay may be avoided. Moreover, a DIP of a signal is avoided still more correctly by asking for an exact delay wave with a delay wave presumption means, and a car information detection means and a positional information judging means, and it has the effectiveness that much more improvement of an error rate is obtained by this.
[0164] It is also possible to, use with a switch the signal acquired from two or more antennas on the other hand according to the error situation. The antenna change-over conditions in the case of switching an antenna are explained using drawing 106 . First, past fixed periods, such as for example, a C/N ratio, an one-frame period, etc. of the inputted signal, are searched for, and when [that a C/N ratio is large] an error rate is low, a change-over of an antenna is not performed. Moreover, even when an error rate is high, and also when not continuous, an antenna change-over is not performed. [generating of an error] [a short time] On the other hand, an antenna change-over is performed, when C / N level of an input signal fall or the condition that an error rate is high continues. Here, the change-over timing of an antenna can consider considering as the guard

interval period added to the OFDM signal. It is also possible to calculate the timing which performs an antenna change-over combining vehicle speed information, positional information, etc. In addition, the change-over timing of an antenna can consider considering as the guard interval period added to the OFDM signal. This becomes possible to switch an antenna the optimal to change of the receiving conditions at the time of migration reception. Moreover, the adjustment loss by attenuation of a signal or distribution can be prevented by installing an antenna 9011 and the magnification means 9012 as a configuration of an input means in drawing 97 R> 7 and drawing 98 , and subsequent processings can be performed correctly.

[0165] (Gestalt 41 of operation) Drawing 99 is the block diagram showing the configuration of the digital television broadcast receiving set by the gestalt 41 of operation of this invention. drawing 99 -- setting -- 9001 -- an input means and 9002 -- for a receiving means and 9005, as for a delay wave presumption means and 9008, a recovery means and 9007 are [a delay means and 9003 / a synthetic means and 9004 / a positional information judging means and 9009] car information detection means. It differs in that the receiving means 9004 is connected immediately after the input means 9001 with the gestalt 41 of operation as compared with the configuration of the gestalt 40 of the operation which mentioned above the configuration of the gestalt 41 of operation shown in drawing 99 . Hereafter, reception actuation of the digital television broadcast by the mobile in the gestalt 41 of operation is explained.

[0166] By the input means 9001, such as a receiving antenna, the electric wave of television broadcasting is transformed into an electrical signal, and is transmitted to the receiving means 9004. With the receiving means 9004, from the signal acquired from the input means 9001, only the signal of a required frequency band is extracted and it transmits to the delay means 9002 and the synthetic means 9003. The signal acquired with the receiving means 9004 is delayed according to the delay control signal from the synthetic control means 9006 with the delay means 9002, and is transmitted to the synthetic means 9003. In the synthetic means 9003, according to the synthetic control signal from the synthetic control means 9006, it attaches, and weighting of the gain (gain) is carried out to each of the signal acquired from the signal and the delay means 9002 which were acquired from the receiving means 9004, it is compounded to it, and it transmits to the recovery means 9005. It is possible like the case of the gestalt 40 of operation as synthetic technique to use simple actuation of addition, maximum, etc. here. A signal is restored to it and outputted with the recovery means 9005.

[0167] On the other hand, from the migration receipt information obtained from the recovery information from the recovery means 9005, and the car information detection means 9009, in the delay wave presumption means 9007 and the positional information judging means 9008, a delay wave is presumed like the gestalt 40 of operation, respectively, it transmits to the synthetic control means 9006, and the delay and the composition which search for the control signal to the delay means 9002 and the synthetic means 9003 in the synthetic control means 9006 are controlled. In the above-mentioned reception actuation, actuation of a synthetic control means and detailed actuation of actuation of a car information detection means are the same as that of the gestalt 40 of operation. According to the receiving set by the gestalt 41 of operation, since processing of the delay means 9002 or the synthetic means 9003 is having the frequency and the band restricted by the receiving means 9004 of the preceding paragraph, while it can simplify processing, effectiveness equivalent to the gestalt 40 of operation is acquired.

[0168] Moreover, as shown in drawing 100 , there is also the approach of installing two or more input means 9001, receiving means 9004, and delay means 9002, respectively, and receiving. Since actuation of a configuration of being shown in this drawing 100 is the same as that of the operation gestalt explained above, detailed explanation is omitted. It is set to an input level which the condition of interference is different and is different, respectively by installing two or more input means 9001, receiving means 9004, and delay means 9002 also when having received the same broadcasting electric-wave with each input means, and generates in the location where the location

(frequency) and the depth of a DIP as this showed in drawing 103 are different, respectively. Therefore, it becomes possible for a DIP location to differ from the depth of a DIP and to lower the error rate of a signal as a result by applying the input from which plurality differs.

[0169] (Gestalt 42 of operation) Fig. 101 is the block diagram showing the configuration of the digital television broadcast receiving set by the gestalt 42 of operation of this invention. drawing 101 -- setting -- 9001 -- for a recovery means and 9007, as for a recovery control means and 9008, a delay wave presumption means and 9055 are [an input means and 9004 / a receiving means and 9005 / a positional information judging means and 9009] car information detection means. Hereafter, according to drawing 101 , it is a mobile or reception actuation of digital television broadcast in a fixed location is explained.

[0170] By the input means 9001, such as a receiving antenna, the electric wave of television broadcasting is transformed into an electrical signal, and is transmitted to the receiving means 9004. With the receiving means 9004, from the signal acquired from the input means 9001, only the signal of a required frequency band is extracted and it is transmitted to the recovery means 9005. With a recovery means, while restoring to the signal from the receiving means 9004 and outputting a digital signal, a recovery situation is transmitted to the delay wave presumption means 9007.

[0171] Actuation of the recovery means 9005 is explained in detail here. Actuation is explained about the example of 1 configuration which consists of the frequency-analysis means 9051, an adjustment means 9052, and a decryption means 9053 as a recovery means 9005. By cycle tools of analysis, such as FFT, real FFT, and DFT, FHT, the signal acquired from the receiving means 9004 has frequency analysis performed by the frequency-analysis means 9051, is changed into the signal on a frequency shaft, and is transmitted to the adjustment means 9052. With the adjustment means 9052, the signal on the frequency shaft acquired with the frequency-analysis means 9051 based on the control signal from the recovery adjustment means 9055 is operated. Technique, such as interpolating the frequency component considered to have emphasized or been missing in the approach of multiplying the signal acquired with the frequency-analysis means 9051 by the transfer function by ******, the method of constituting and calculating a filter, and the specific frequency component from the recovery control means 9055 to a signal as operating instructions, can be considered. The signal acquired with the adjustment means 9052 is decoded to a digital sign with the decryption means 9053. With the delay wave presumption means 9007, a delay wave is presumed based on the signal acquired from the recovery means 9005. There are frequency spectrum obtained from the frequency-analysis means 9051 as a signal considered as reference at this time, a pilot signal acquired in the decode process of the decryption means 9053. The frequency spectrum of an input signal produces a DIP etc. according to existence of a delay wave, as shown in drawing 103 . It is more possible than frequency spectrum becomes a flat in the ODFM modulation technique used by digital television broadcast to presume the magnitude of a delay wave and a time delay. Moreover, magnitude of a delay wave and presumption of a time delay can be performed also from the phase change of an input signal, or lack. Based on the delay wave information acquired from the delay wave presumption means 9007 or the positional information judging means 9008, the adjustment means 9052 is controlled by the recovery control means 9055. Although the control parameter according to the adjustment means 9052 will be decided and transmitted as the control approach, in multiplying the adjustment means 9052 by the transfer function, for example, in quest of the transfer function according to a delay wave, it transmits by the recovery control means 9055. Or in the case of a tap in a filter factor and interpolation, a interpolation value is transmitted. Since the positional information judging means 9008 and the car information detection means 9009 are equivalent to the gestalten 40 and 41 of operation, detailed explanation is omitted here.

[0172] As mentioned above, in order according to the gestalt of this operation to operate so that the effect of a delay wave may decrease with the adjustment means 9052, it has the effectiveness that the error rate of a digital signal which exact decode was attained and received is improved.

[0173] The configuration which used two or more input means 9001 is shown in drawing 102 . In this

case, according to the number of input means, a receiving means is required and two or more frequency-analysis means are also further needed. About an adjustment means and a decryption means, more than one may not be required by choosing the signal to process. In addition, in drawing 102 , each block of the frequency-analysis means 9051, the adjustment means 9052, and the decryption means 9053 is set to one in order to simplify an expression, but as mentioned above, each of these means shall possess two or more means according to the number of input means.

[0174] Since frequency analysis is performed for every input means in the configuration of drawing 102 , the magnitude of a delay wave and a time delay can presume for every input means. Therefore, it is possible to choose the signal with the most sufficient receive state with the adjustment means 9052. Moreover, it is also possible to adjust a transfer function, a filter, or interpolation etc. which was mentioned above for every signal, and to decode with the decryption means 9053, respectively. With the decode means 9053 or the adjustment means 9052, the recovery of a good digital sign is attained by choosing and processing only the signal of the good frequency spectrum of a receive state from the frequency-analysis result of the signal from each input means. As stated above, a reception error is more improvable by establishing two or more input means with the configuration of drawing 102 .

[0175] In addition, in the digital television broadcast receiving set of various this inventions mentioned above, when an antenna has two or more antenna elements, it can install by designing an antenna element, respectively so that the include angle may be differed mutually, so that it may have the maximum sensitivity to the electric wave of different plane of polarization.

[0176]

[Effect of the Invention] Since it can miniaturize so that it unites with the car body near [, such as an automobile,] the car body, and it can install on a flat surface and arrangement may be possible also in a narrow location, the antenna equipment in the digital television broadcast receiving set applied to this invention is also that clearly from the place described above is convenient.

[0177] Moreover, in the digital television broadcast receiving set in this invention, by delaying a signal and compounding an input signal immediately after an input or after reception, the failure by the delay wave contained in an input signal is mitigated, and it is effective in improving the error rate after a recovery.

[0178] In the digital television broadcast receiving set in this invention, by calculating a time delay and the amount of delay from the signal to which the above was delayed and it restored for the control to compound, or the signal of a recovery process, and performing composition and control of delay using the amount of presumed delay and time amount, the failure by the delay wave can be removed correctly and the error rate after a recovery can be improved further.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 1st operation concerning this invention.
[Drawing 2] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 1st operation.
[Drawing 3] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 2nd operation concerning this invention.
[Drawing 4] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 2nd operation.
[Drawing 5] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 3rd operation concerning this invention.
[Drawing 6] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 3rd operation.
[Drawing 7] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 3rd operation.
[Drawing 8] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 3rd operation.
[Drawing 9] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 4th operation concerning this invention.
[Drawing 10] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 4th operation.
[Drawing 11] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 4th operation.
[Drawing 12] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 4th operation.
[Drawing 13] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 5th operation concerning this invention.
[Drawing 14] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 5th operation.
[Drawing 15] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 6th operation concerning this invention.
[Drawing 16] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 6th operation.
[Drawing 17] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 6th operation.
[Drawing 18] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of this 6th operation.

[Drawing 19] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 7th operation concerning this invention.
[Drawing 20] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 7th operation.
[Drawing 21] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 7th operation.
[Drawing 22] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 8th operation concerning this invention. [Drawing 23] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 8th operation.
[Drawing 24] It is drawing showing the physical relationship of the antenna and conductor cope plate in antenna equipment in the gestalt of this 8th operation.
[Drawing 25] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 9th operation concerning this invention.
[Drawing 26] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 10th operation concerning this invention.
[Drawing 27] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 11th operation concerning this invention.
[Drawing 28] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 11th operation.
[Drawing 29] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 12th operation concerning this invention.
[Drawing 30] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 13th operation concerning this invention.
[Drawing 31] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 14th operation concerning this invention.
[Drawing 32] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 15th operation concerning this invention.
[Drawing 33] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 15th operation.
[Drawing 34] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 16th operation concerning this invention.
[Drawing 35] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 17th operation concerning this invention.
[Drawing 36] It is an external view explaining the example of the installation in the antenna equipment in the gestalt of the 18th operation concerning this invention.
[Drawing 37] It is an external view explaining another example of the installation in the antenna equipment in the gestalt of this 18th operation.
[Drawing 38] It is the mimetic diagram showing the example of the mobile communication device equipped with the antenna equipment in the gestalt of the 19th operation concerning this invention.
[Drawing 39] It is the mimetic diagram showing the example of the cellular phone equipped with the antenna equipment in the gestalt of the 20th operation concerning this invention.
[Drawing 40] It is drawing showing the example of the band composition in this invention.
[Drawing 41] It is drawing showing the example of the gain accumulation in this invention.
[Drawing 42] It is the sketch block diagram showing the antenna equipment in the gestalt of the 21st operation concerning this invention.
[Drawing 43] It is the mimetic diagram showing another example of the antenna equipment in the gestalt of this 21st operation.
[Drawing 44] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 22nd operation concerning this invention.
[Drawing 45] It is the mimetic diagram showing the example of the antenna equipment in the gestalt

of the 23rd operation concerning this invention.
[Drawing 46] It is the mimetic diagram showing the example of the antenna equipment in the gestalt of the 24th operation concerning this invention.
[Drawing 47] It is the external view showing the example of application to the car body in the antenna equipment in the gestalt of the 25th operation concerning this invention.
[Drawing 48] It is the external view showing the example of application to each part of a car body of the installation part of the antenna in the gestalt of the 26th operation concerning this invention.
[Drawing 49] It is drawing explaining the property of the antenna in the gestalt of this 26th operation.
[Drawing 50] It is the mimetic diagram showing the configuration of the antenna in the gestalt of the 27th operation concerning this invention.
[Drawing 51] It is the mimetic diagram showing another configuration of the antenna in the gestalt of this 27th operation.
[Drawing 52] It is the external view showing the example of application to each part of a car body of the installation part of the antenna in the gestalt of this 27th operation.
[Drawing 53] It is the external view showing the example of application to the cellular phone of the antenna in the gestalt of this 27th operation.
[Drawing 54] It is the external view showing the example of application to the common house of the antenna in the gestalt of this 27th operation.
[Drawing 55] It is the mimetic diagram showing the configuration of the antenna in the gestalt of the 28th operation concerning this invention.
[Drawing 56] The mimetic diagram and this drawing (b) showing the configuration of the antenna of another example [in / in this drawing (a) / the gestalt of this 28th operation] are the explanatory view.
[Drawing 57] It is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 29th operation concerning this invention.
[Drawing 58] It is the mimetic diagram showing the configuration of the antenna of another example in the gestalt of this 29th operation.
[Drawing 59] It is the mimetic diagram showing the configuration of the antenna of example another again in the gestalt of this 29th operation.
[Drawing 60] The mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 30th operation which this drawing (a) and (b) require for this invention, and this drawing (c) are drawings explaining the frequency characteristics.
[Drawing 61] The mimetic diagram showing the configuration of the antenna of another example [in / in this drawing (a) and (b) / the gestalt of this 30th operation] and this drawing (c) are drawings explaining the frequency characteristics.
[Drawing 62] The mimetic diagram showing the configuration [in / in this drawing (a) and (b) / the gestalt of this 30th operation] of the antenna of example another again and this drawing (c) are drawings explaining the frequency characteristics.
[Drawing 63] It is drawing showing the example of application of the antenna equipment in the gestalt of the 29th operation.
[Drawing 64] It is drawing showing another example of application of the antenna equipment in the gestalt of the 29th operation.
[Drawing 65] It is drawing showing example of application of the antenna equipment in the gestalt of the 29th operation another again.
[Drawing 66] It is drawing showing still more nearly another example of application of the antenna equipment in the gestalt of the 29th operation.
[Drawing 67] It is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 31st operation concerning this invention.
[Drawing 68 </A>] It is the mimetic diagram showing the configuration of the antenna of another

example in the gestalt of this 31st operation.
[Drawing 69] It is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 32nd operation concerning this invention.
[Drawing 70] It is the mimetic diagram showing the configuration of the antenna of another example in the gestalt of this 32nd operation.
[Drawing 71] It is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 33rd operation concerning this invention.
[Drawing 72] It is the mimetic diagram showing the configuration of the antenna of another example in the gestalt of this 33rd operation.
[Drawing 73] It is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 34th operation concerning this invention.
[Drawing 74] It is the mimetic diagram showing the configuration of the antenna of another example in the gestalt of this 34th operation.
[Drawing 75] It is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 35th operation concerning this invention.
[Drawing 76] It is the mimetic diagram showing the configuration of the antenna of another example in the gestalt of this 35th operation.
[Drawing 77] It is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 36th operation concerning this invention.
[Drawing 78] It is the mimetic diagram showing another example of a pattern in the gestalt of this 36th operation.
[Drawing 79] It is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 37th operation concerning this invention.
[Drawing 80] It is the mimetic diagram showing the configuration of the antenna of another example in the gestalt of this 37th operation.
[Drawing 81] It is the mimetic diagram showing the configuration of the antenna of another example in the gestalt of this 37th operation.
[Drawing 82] It is the mimetic diagram showing the configuration of the antenna of another example in the gestalt of this 37th operation.
[Drawing 83] It is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 38th operation concerning this invention.
[Drawing 84] It is the mimetic diagram showing the example of the configuration of the antenna in the gestalt of the 39th operation concerning this invention.
[Drawing 85] It is the perspective view showing the concrete configuration of the antenna equipment in drawing 2 .
[Drawing 86] It is drawing showing the impedance and VSWR property in an antenna of drawing 85 .
[Drawing 87] It is drawing showing the directive gain characteristics in the antenna of drawing 85 .
[Drawing 88] It is drawing showing the VSWR property of one element for explaining the band composition in four antennas.
[Drawing 89] It is drawing showing other VSWR properties of one element for explaining the band composition in four antennas.
[Drawing 90] It is drawing showing other VSWR properties of one element for explaining the band composition in four antennas.
[Drawing 91] It is drawing showing other VSWR properties of one element for explaining the band composition in four antennas.
[Drawing 92] It is drawing showing the VSWR property when carrying out band composition of the four-element antenna from drawing 88 to drawing 91 .
[Drawing 93] It is drawing showing the VSWR property at the time of enlarging the range of the axis of ordinate in drawing 92 .
[Drawing 94] It is drawing showing the directive gain characteristics when changing the installation

distance of the antenna ground and equipment ground in the antenna of drawing 44 (b).
[Drawing 95] It is drawing showing the directive gain characteristics in the antenna of drawing 55 (a).

[Drawing 96] It is drawing showing the directive gain characteristics in the antenna of drawing 55 (b).

[Drawing 97] The block diagram showing the configuration of the digital television broadcast receiving set by the gestalt of operation of this invention
[Drawing 98] The block diagram showing the configuration of the digital television broadcast receiving set by the gestalt of other operations of this invention
[Drawing 99] The block diagram showing the configuration of the digital television broadcast receiving set by the gestalt of other operations of this invention
[Drawing 100] The block diagram showing the configuration of the digital television broadcast receiving set by the gestalt of other operations of this invention
[Drawing 101] The block diagram showing the configuration of the digital television broadcast receiving set by the gestalt of other operations of this invention
[Drawing 102] The block diagram showing the configuration of the digital television broadcast receiving set by the gestalt of other operations of this invention
[Drawing 103] The conceptual diagram showing the frequency-analysis result after the reception at the time of receiving active jamming of a delay wave at the time of reception
[Drawing 104] The conceptual diagram showing gain control of a synthetic means
[Drawing 105] The conceptual diagram having shown the time delay and error rate of a delay wave
[Drawing 106] Drawing for explaining the antenna change-over conditions in the case of switching an antenna
[Description of Notations]
101 104 Antenna element (line conductor)
102 Electric Supply Terminal
205 Conductor Cope Plate
502 504 Reactive element
1304 Printed Circuit Board
1505 Crevice
1806 Multilayer Printed Board
1901 Feeding Point
3003 Dielectric
3203 Coil
3503 Diver Change-over Switch
3804 Communications Apparatus
3805 Car Body
3902 Shielding Case
4603 High Dielectric Constant Material
5603 5606 Ferroelectric
9001 Input Means
9002 Delay Means
9003 Synthetic Means
9004 Receiving Means
9005 Recovery Means
9006 Synthetic Control Means
9007 Delay Wave Prescription Means
9008 Positional Information Judging Means
9009 Car Information Detection Means
9011 Antenna

9012 Magnification Means
9061 Gain Control Means
9062 Time Delay Control Means
9091 Speed Detection Means
9092 Location Detection Means

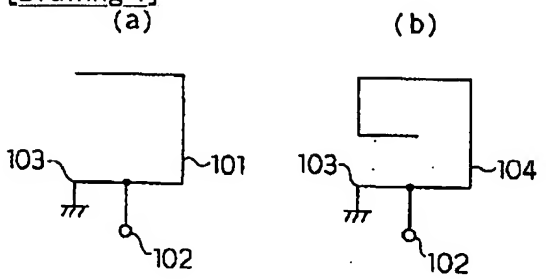
[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]



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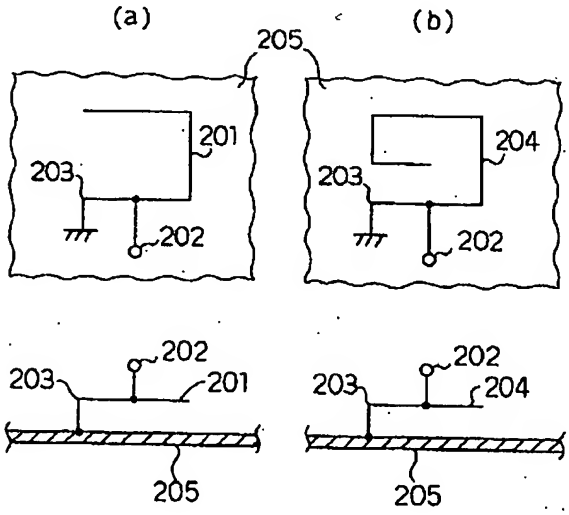

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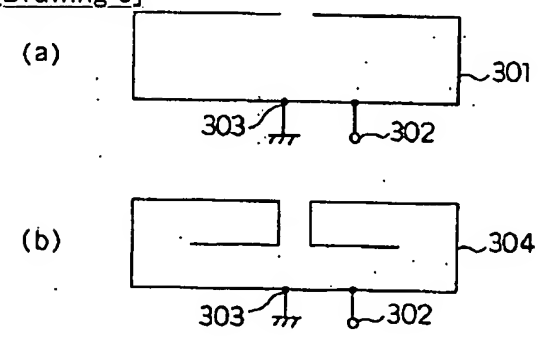

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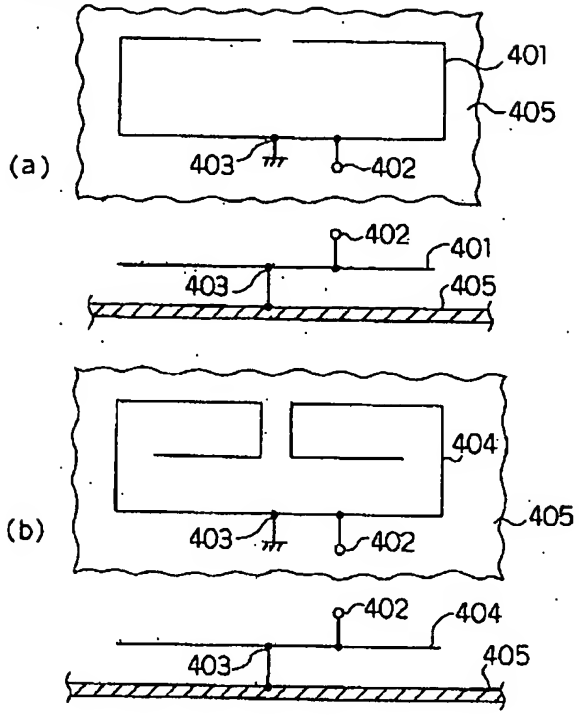

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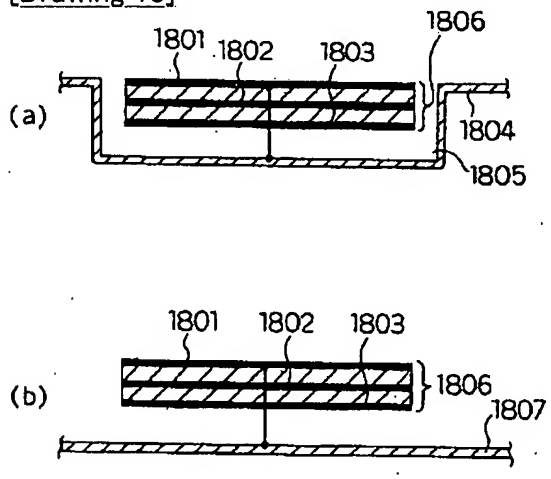

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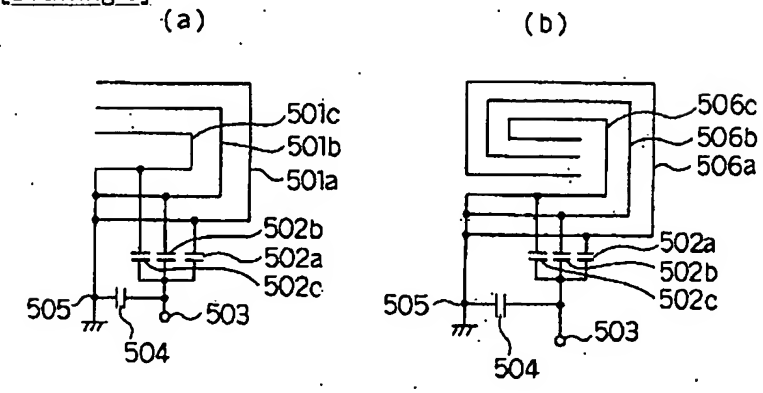

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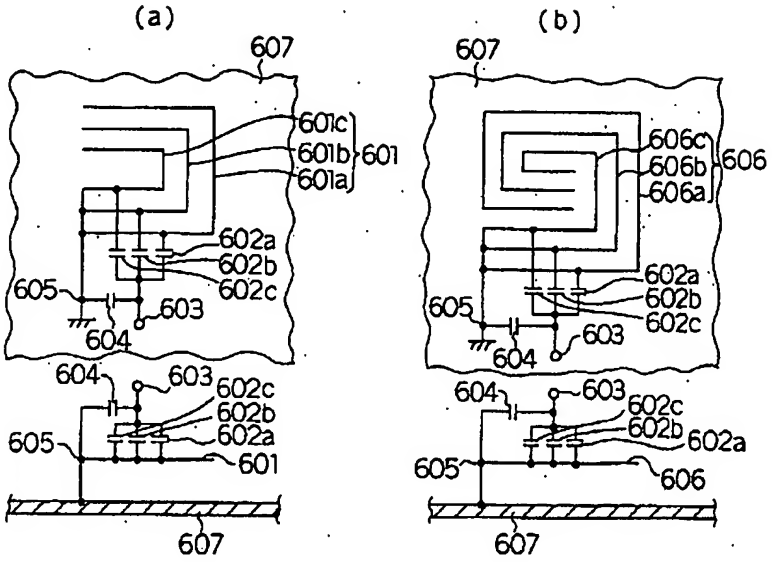

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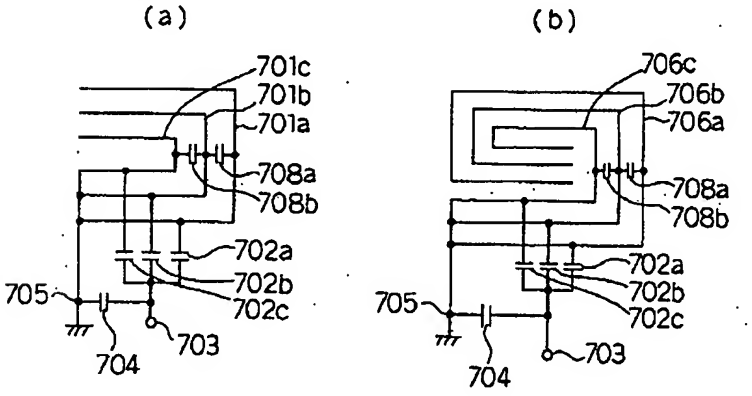

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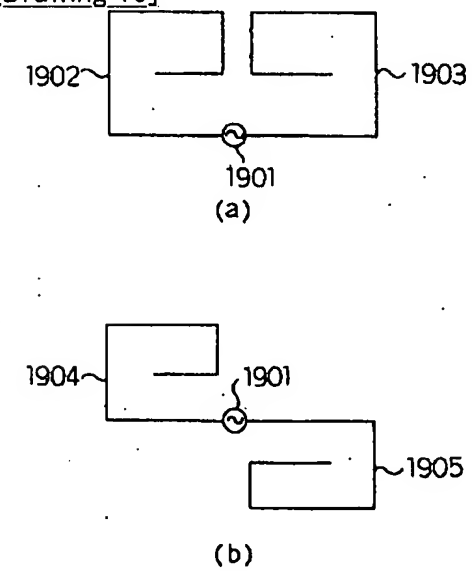

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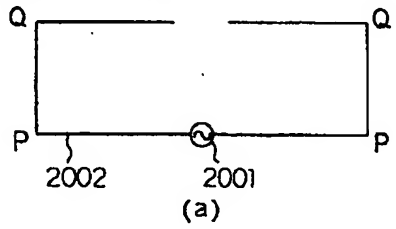
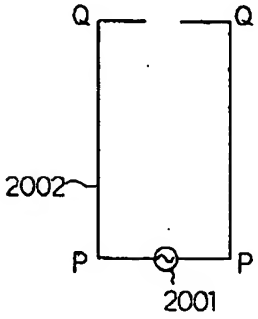
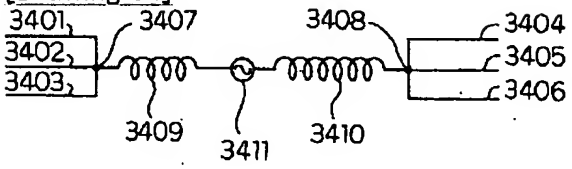




[Drawing 34]



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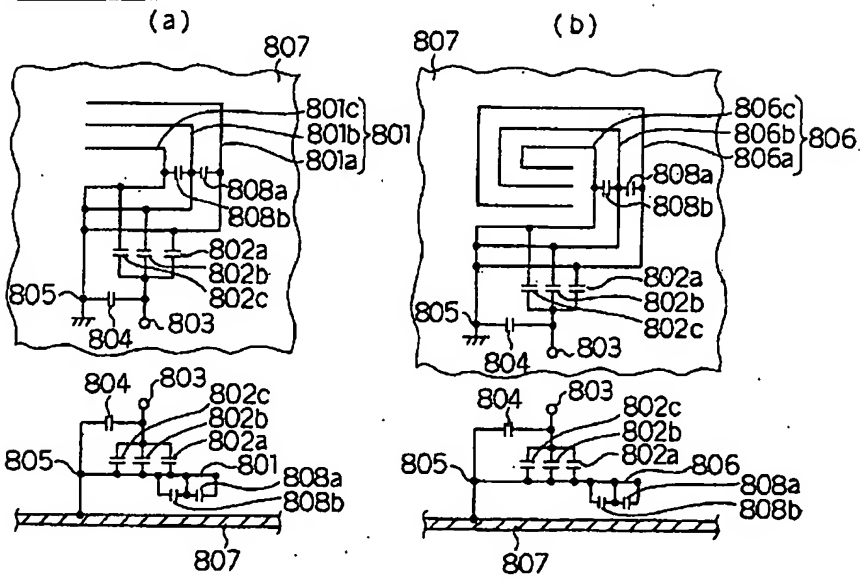

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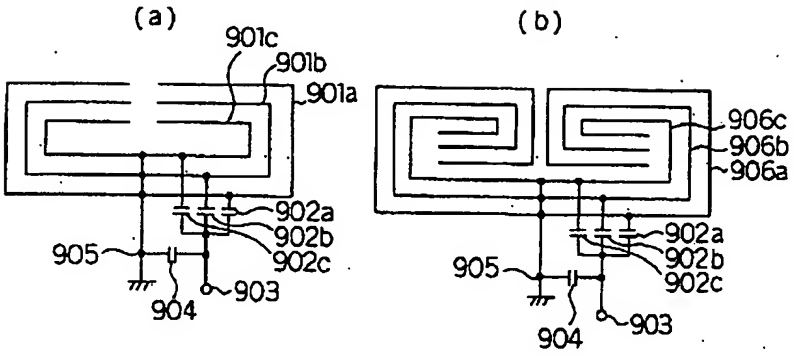

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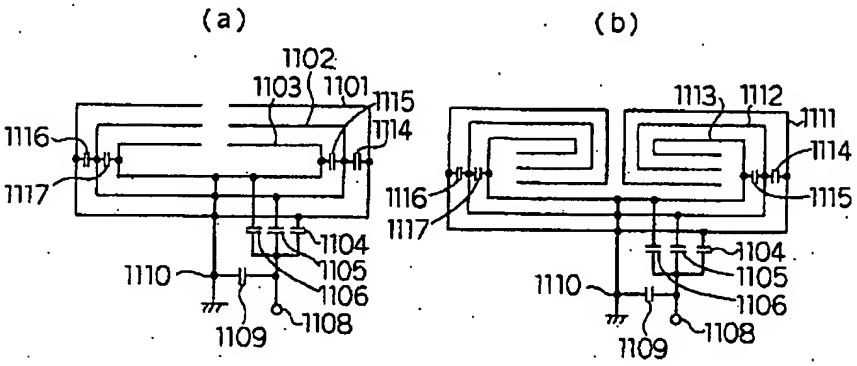

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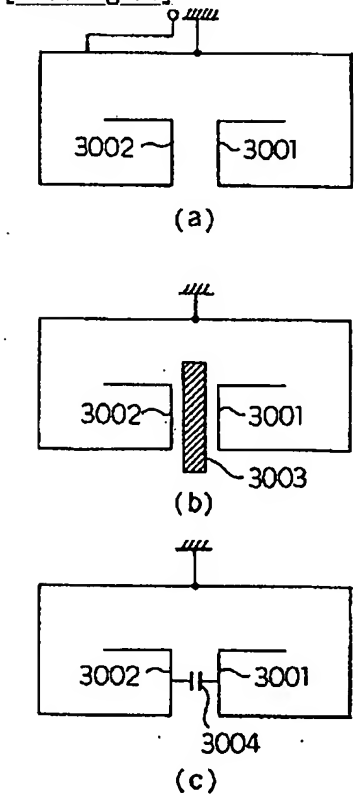

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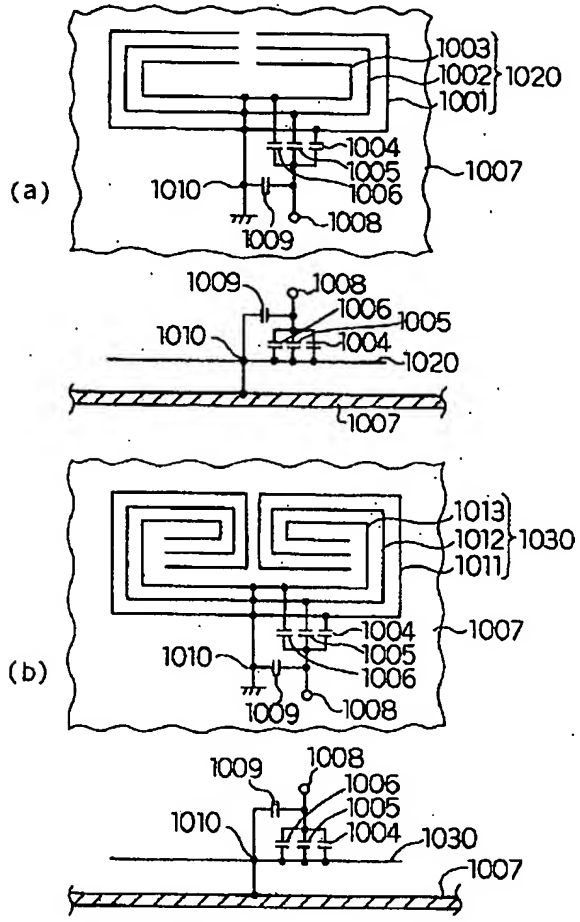
(a)
1003
1002
1001
1020
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1007
1010
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1008
1009
1008
1006
1005
1010
1004
1020
1007
(b)
1013
1012
1011
1030
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1010
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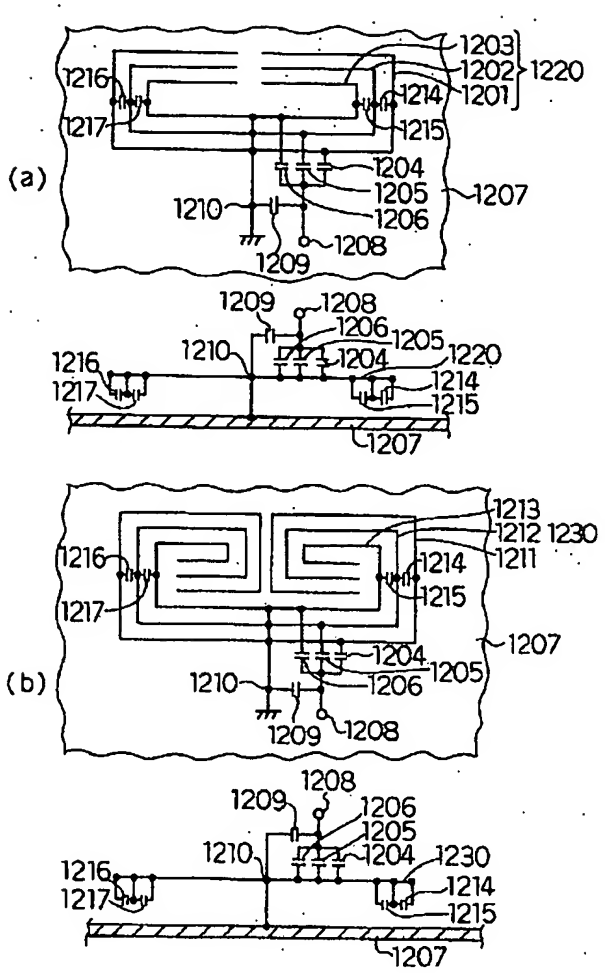
1030
1007

[Drawing 12]



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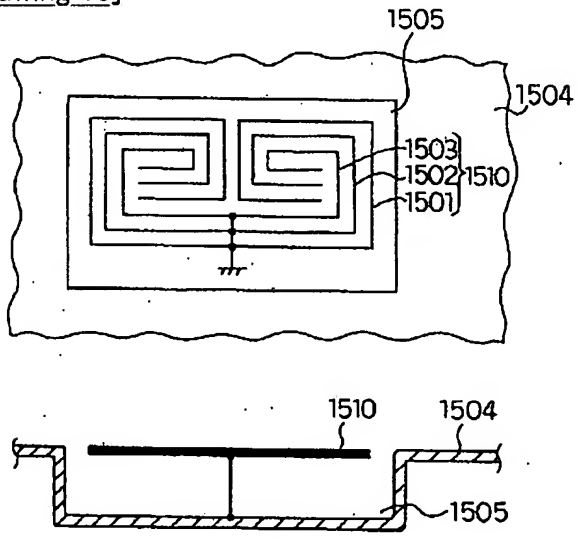

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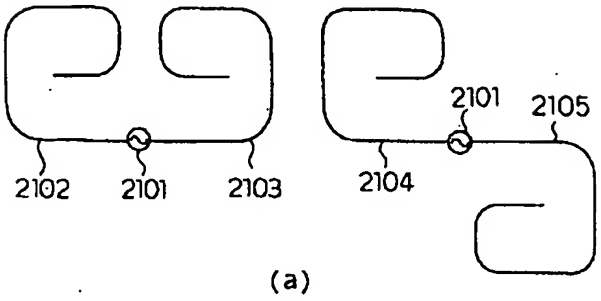

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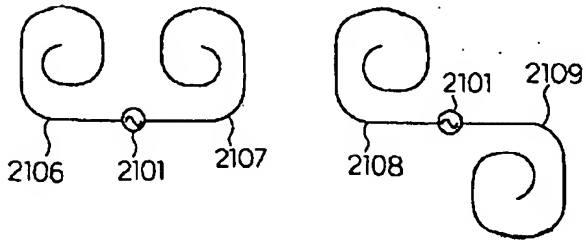

(b)

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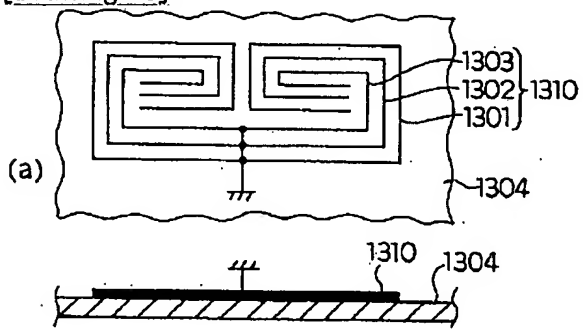

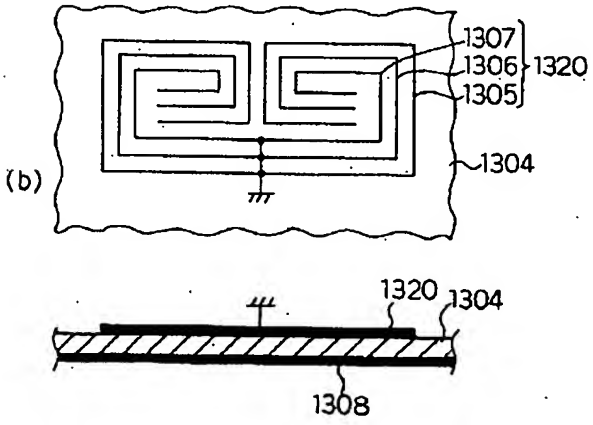

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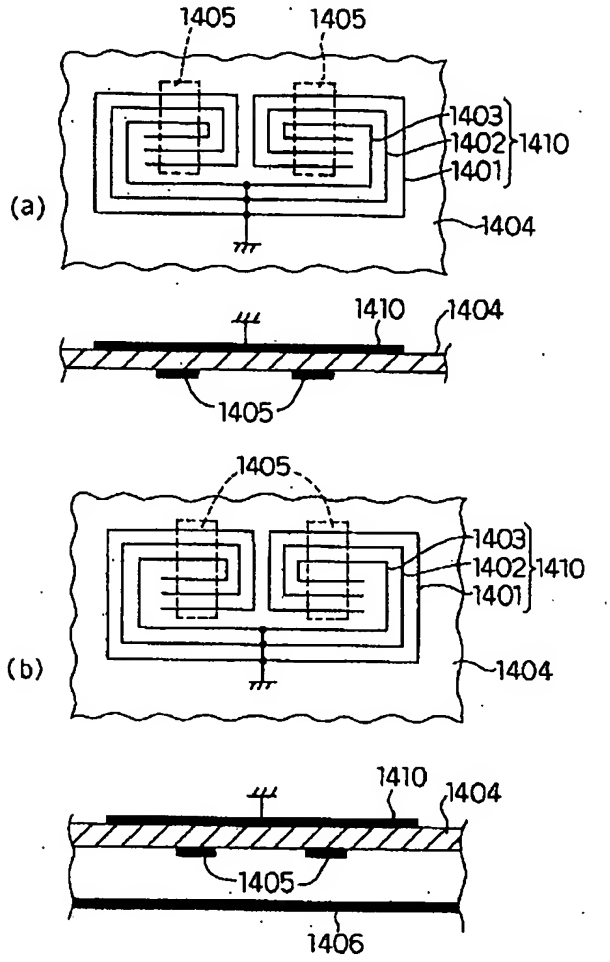
1405
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(a)
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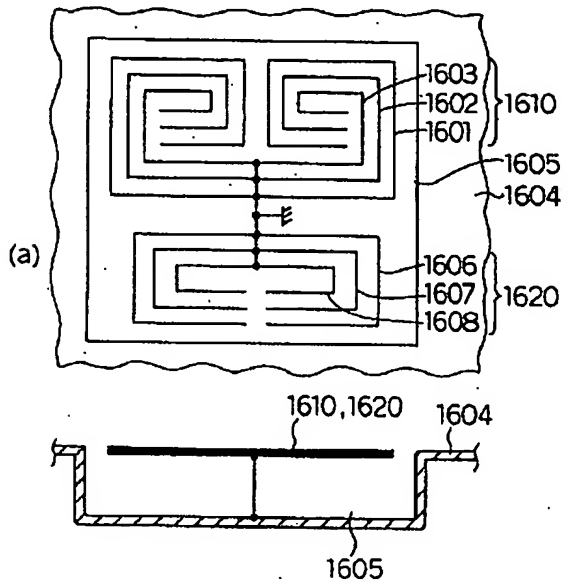
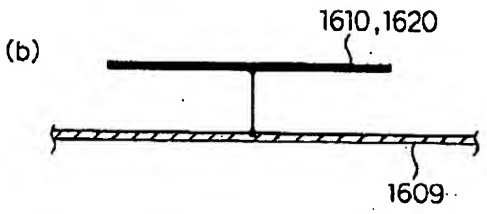
1406

[Drawing 16]





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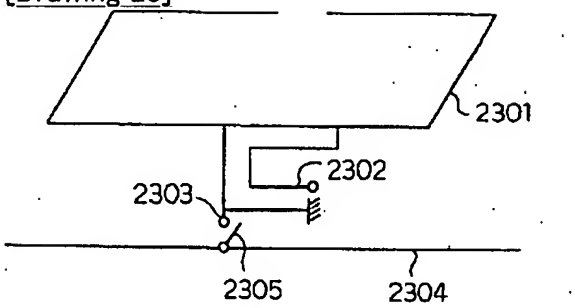

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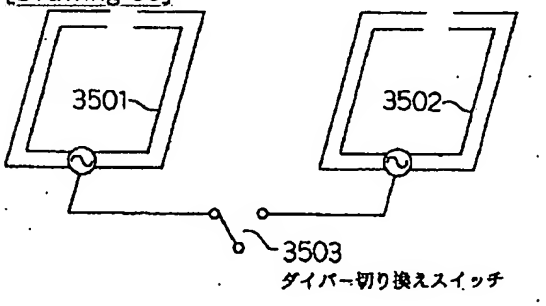

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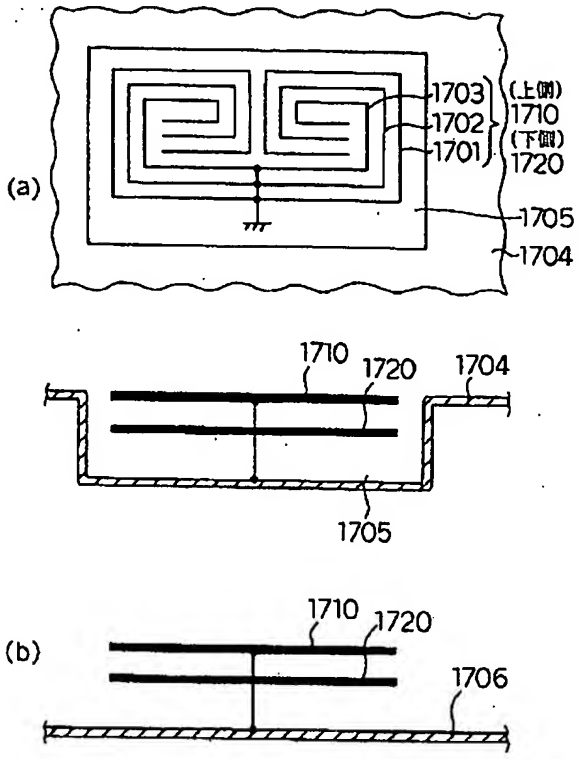

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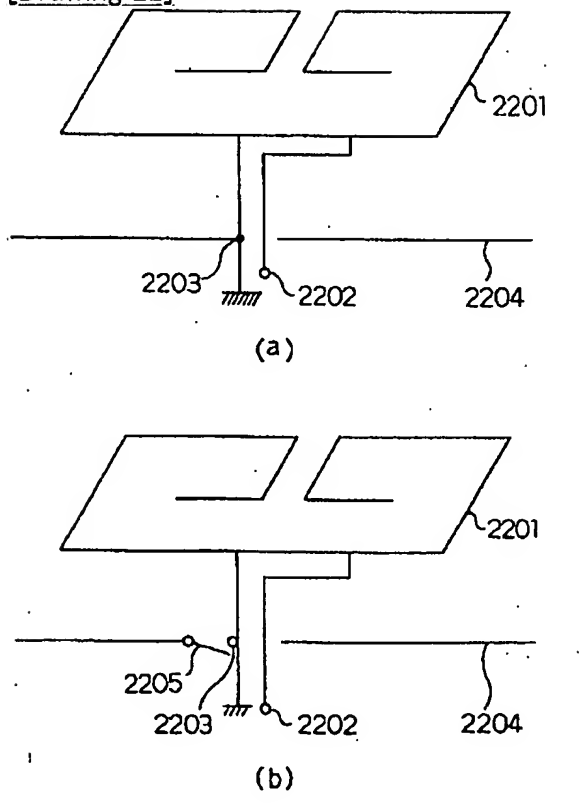

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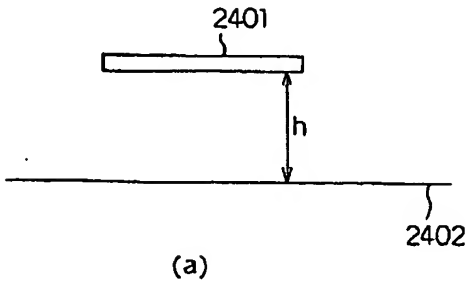

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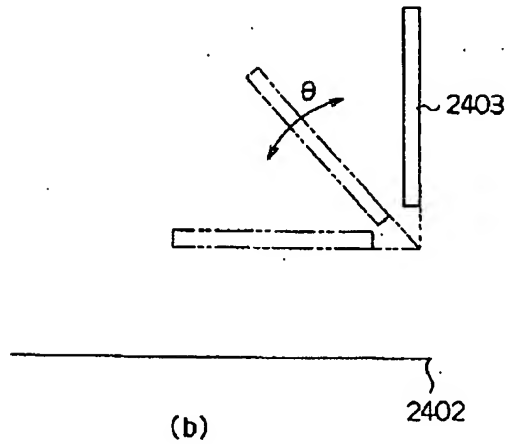
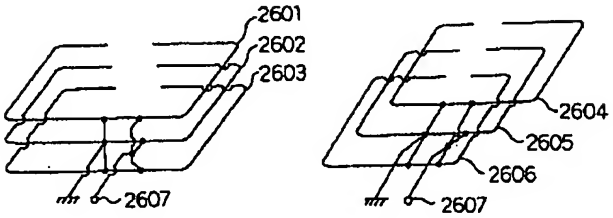


(b)

[Drawing 26]



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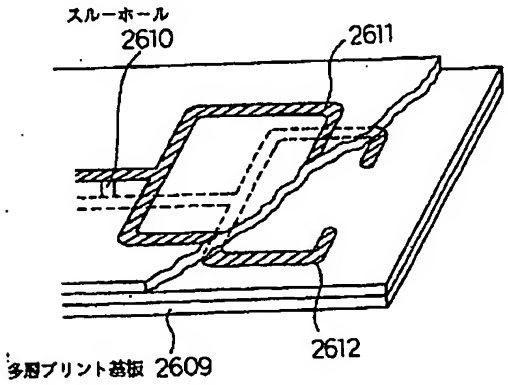

(b)

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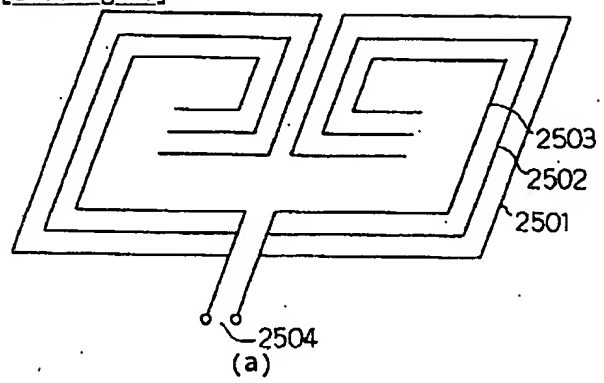

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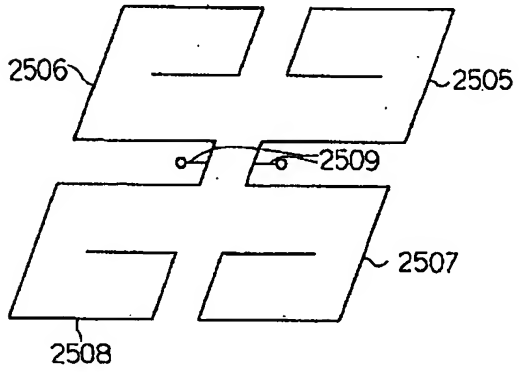

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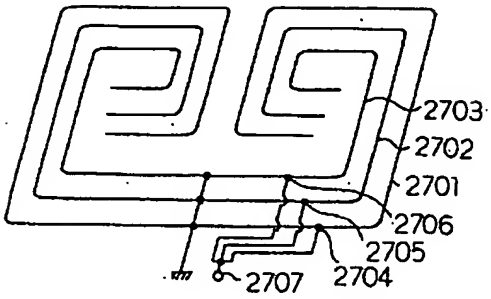

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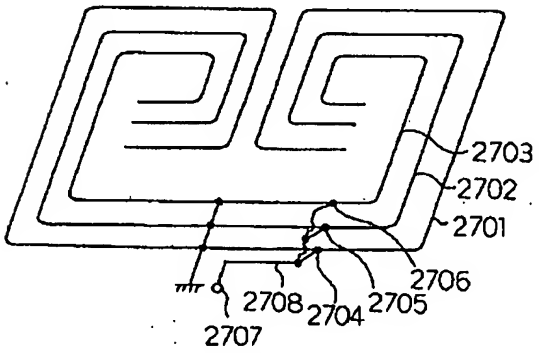
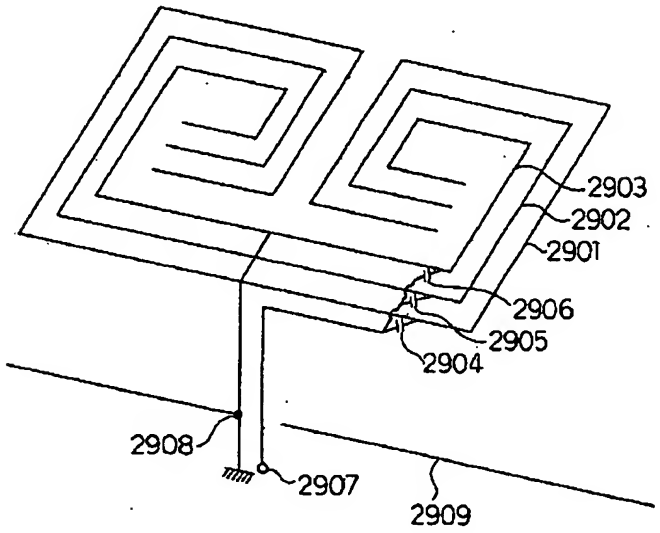
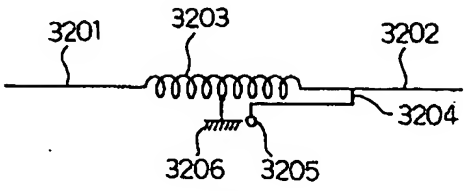


(b)

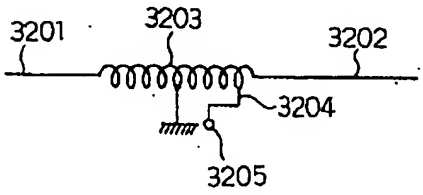
[Drawing 29]



[Drawing 32]

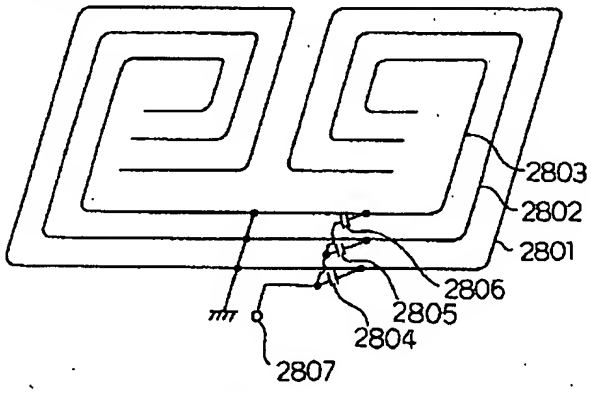


(a)

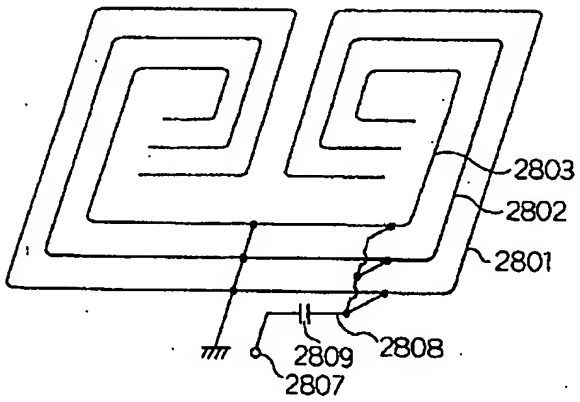


(b)

[Drawing 28]

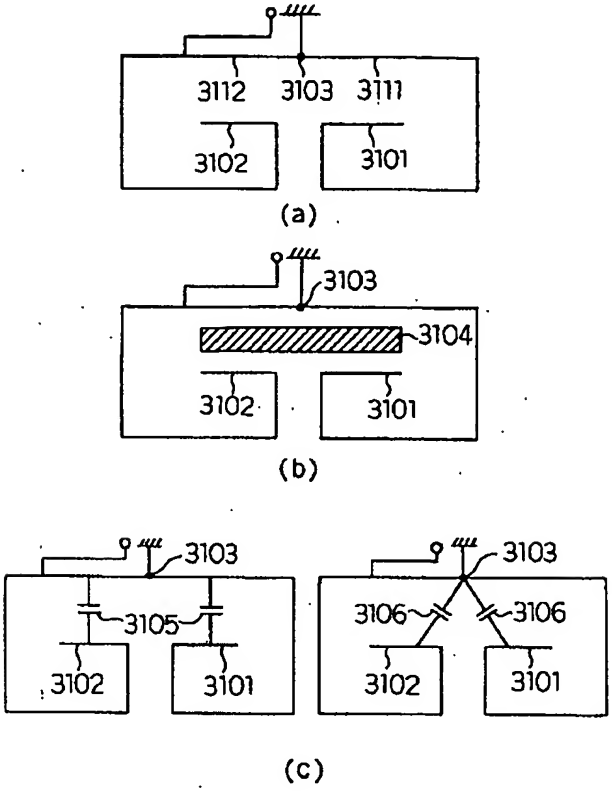


(a)

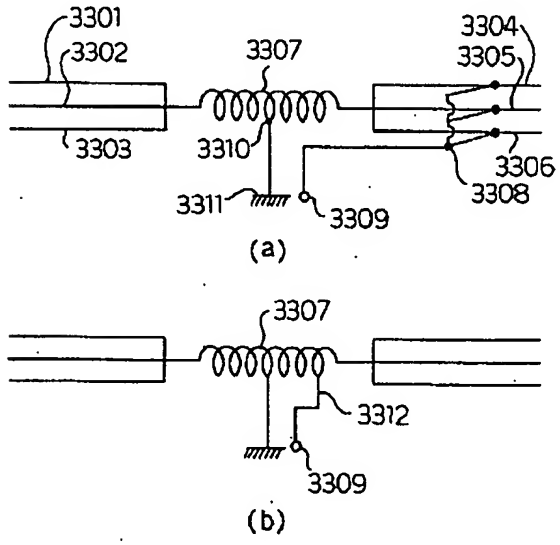


(b)

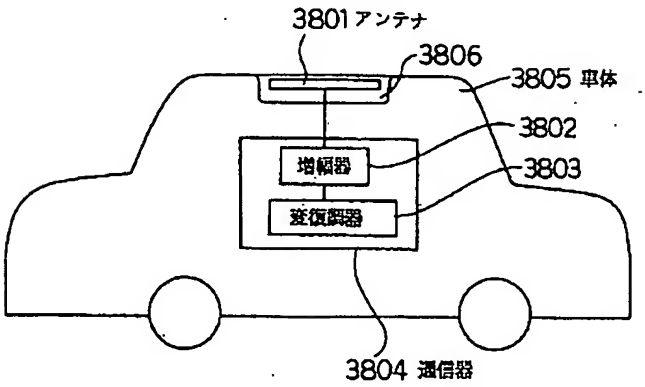
[Drawing 31]



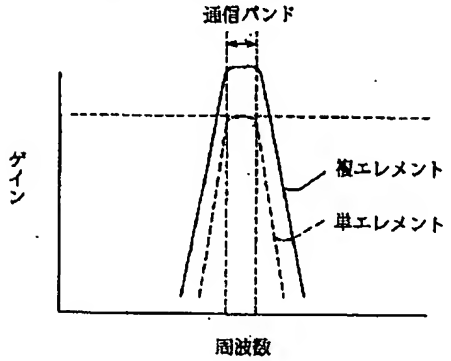
[Drawing 33]



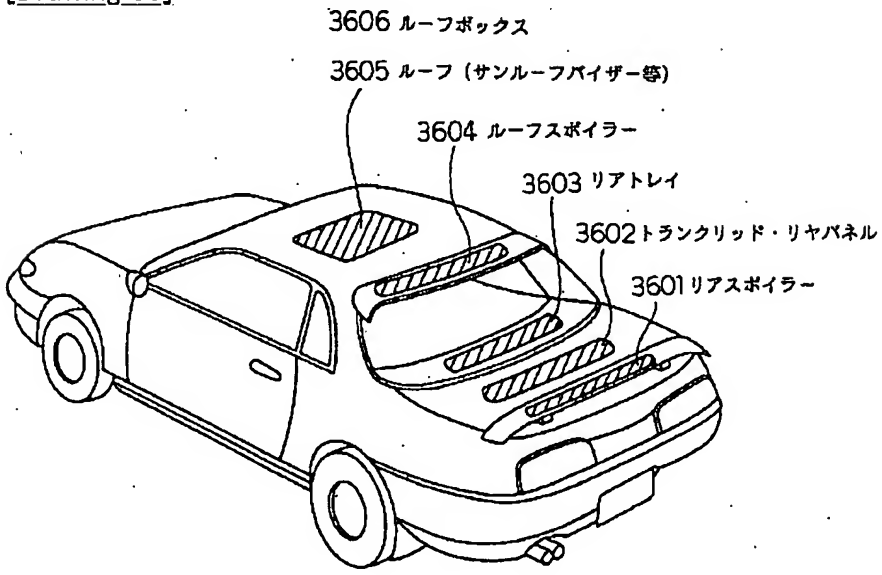
[Drawing 38]



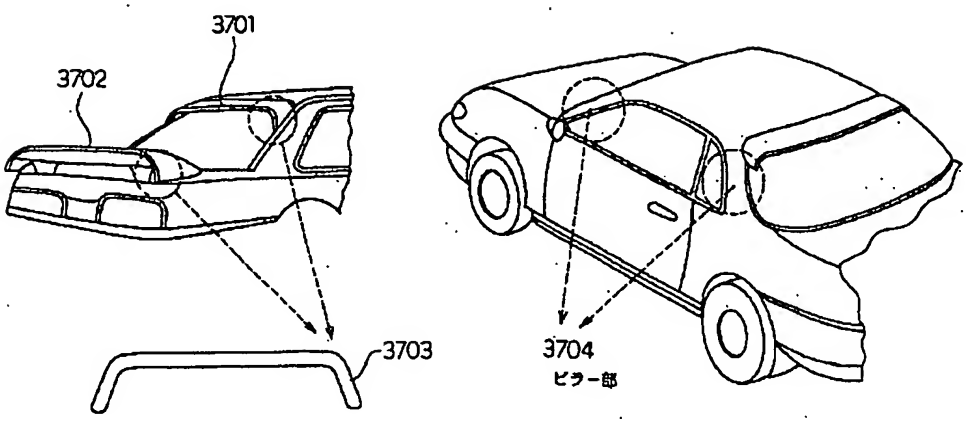
[Drawing 41]



[Drawing 36]



[Drawing 37]



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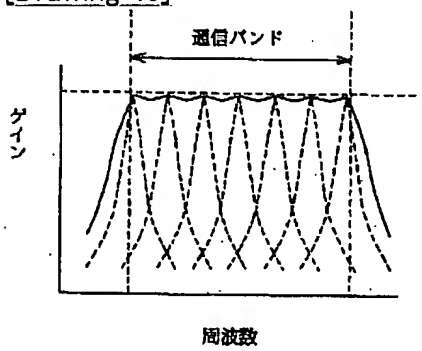

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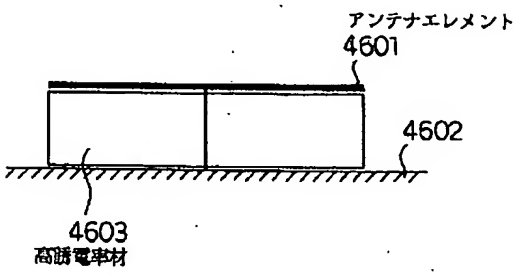
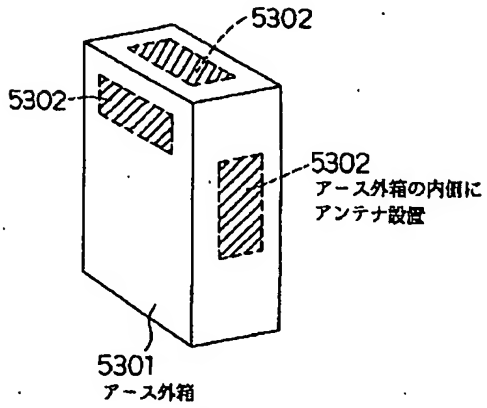
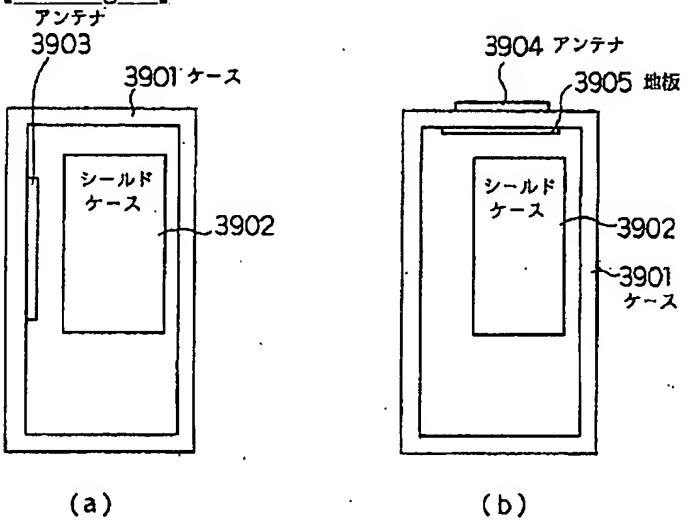


[Drawing 53]

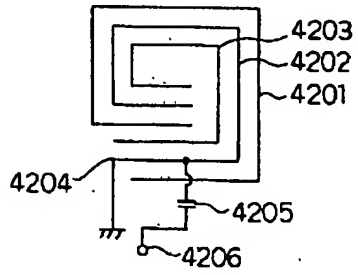


[Drawing 39]

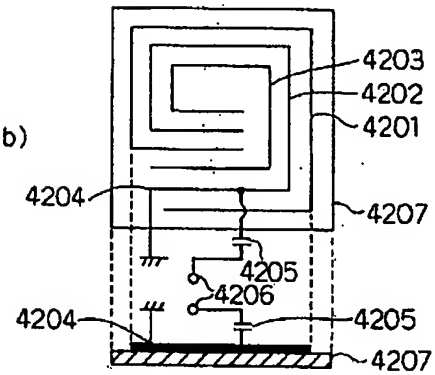


[Drawing 42]

(a)

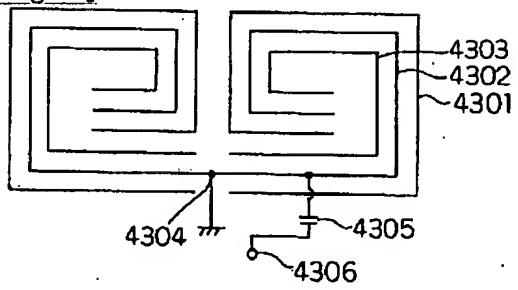


(b)



[Drawing 43]

(a)



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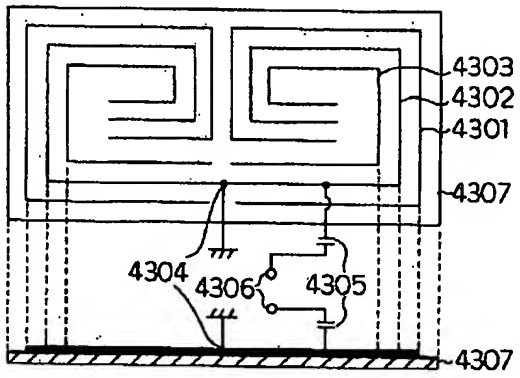
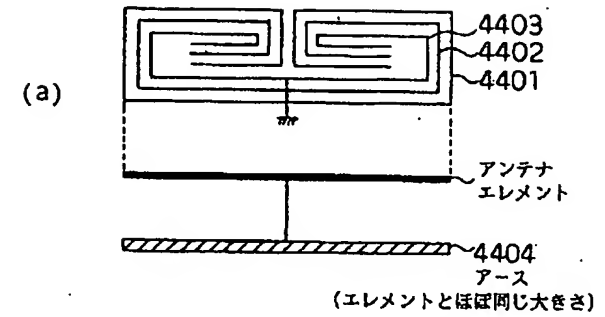
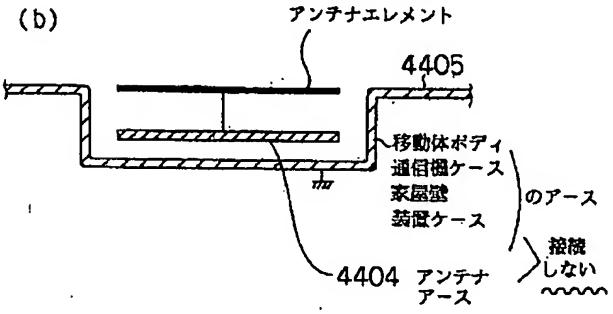
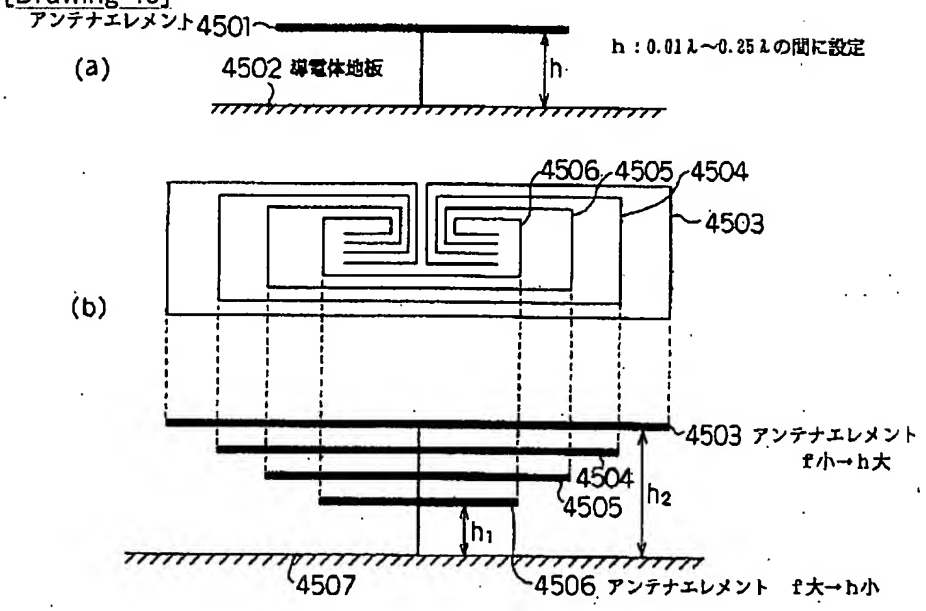


[Drawing 44]

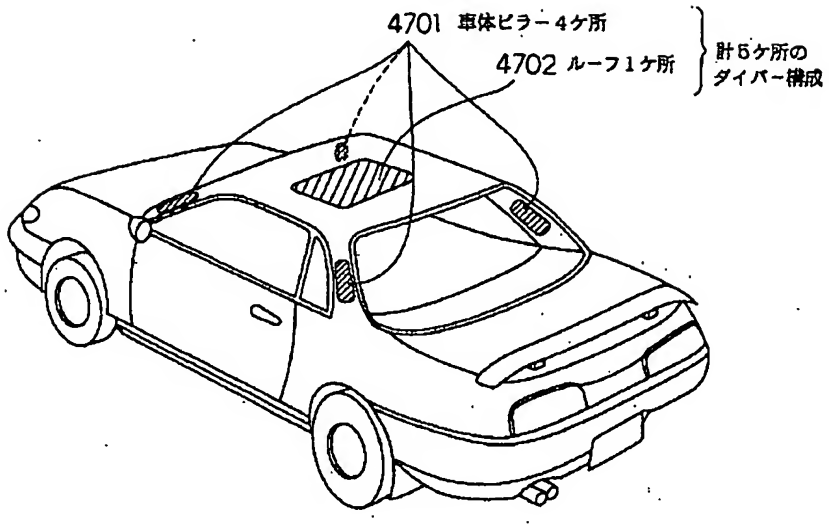




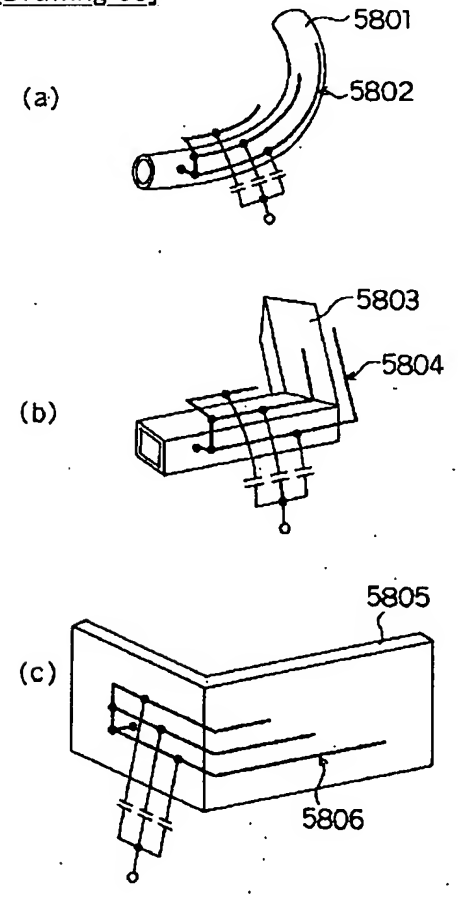
[Drawing 45]



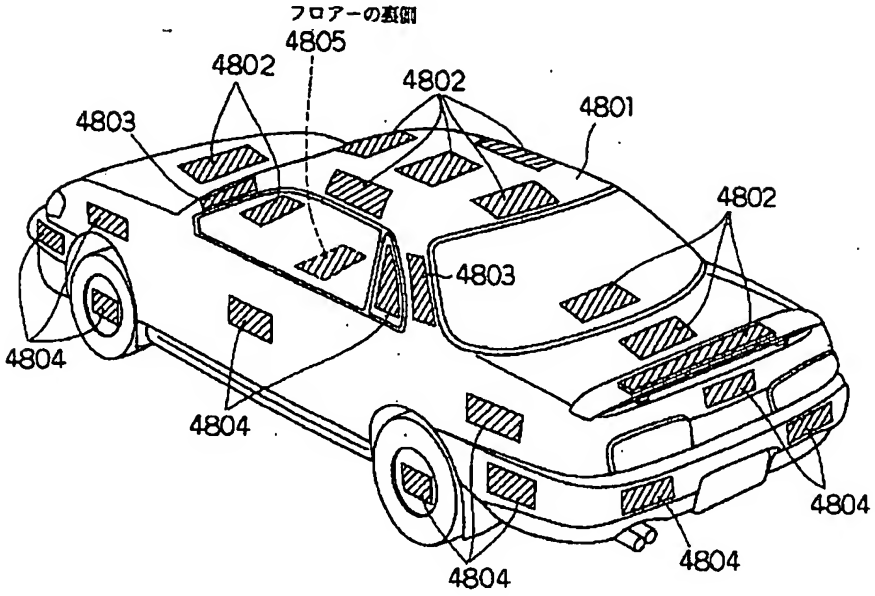
[Drawing 47]



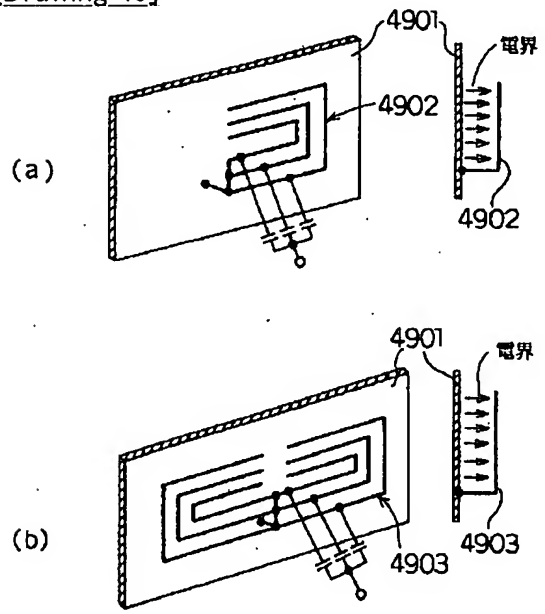
[Drawing 58]



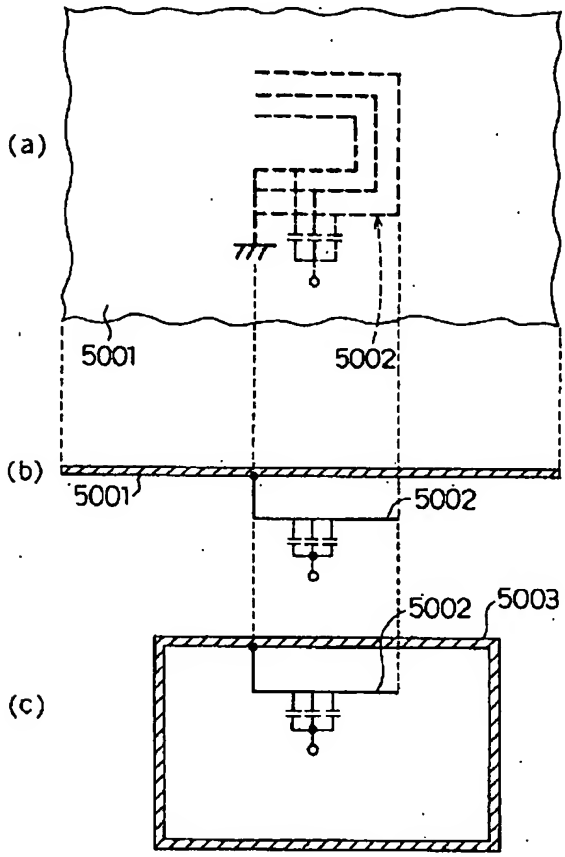
[Drawing 48]



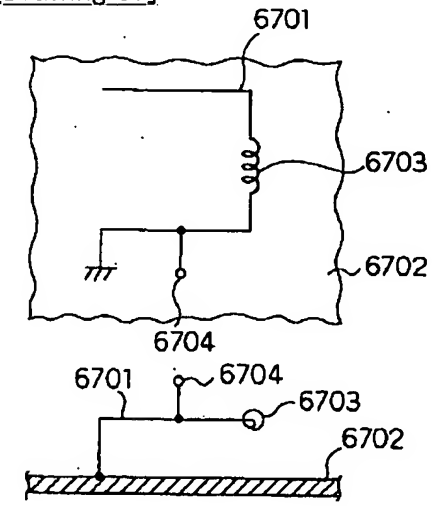
[Drawing 49]



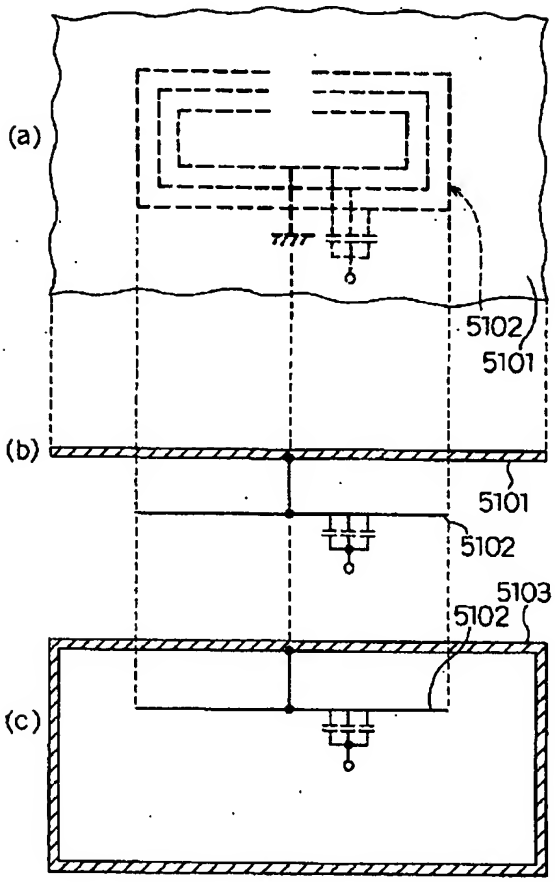
[Drawing 50]



[Drawing 67]



[Drawing 51]



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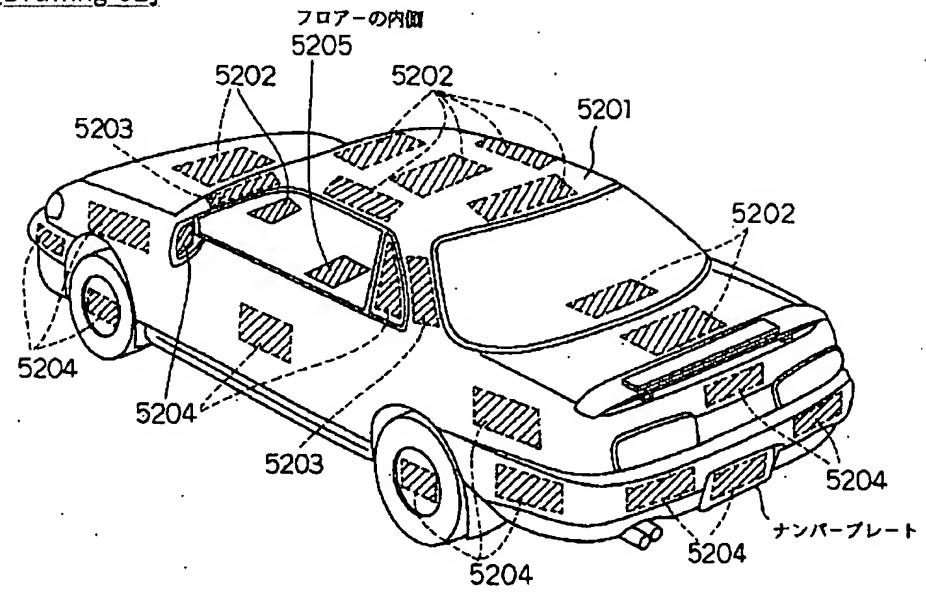
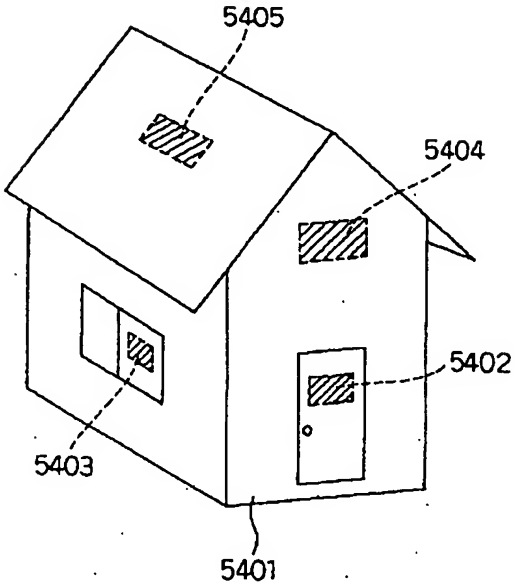
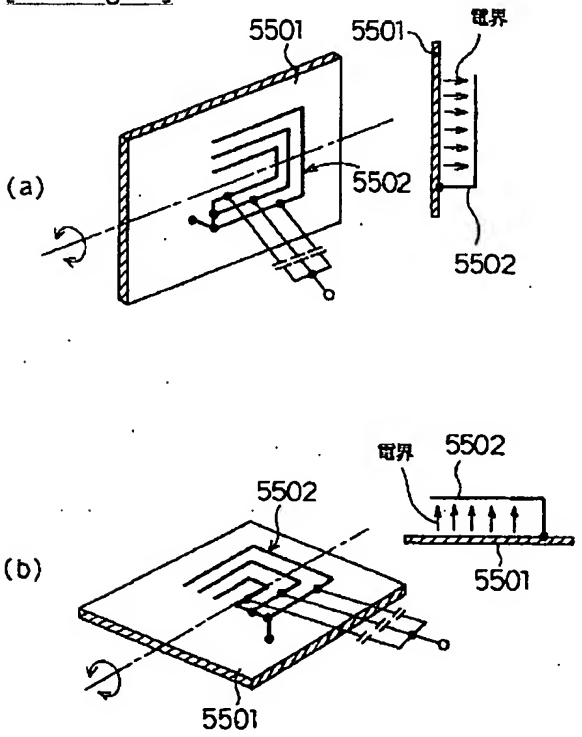


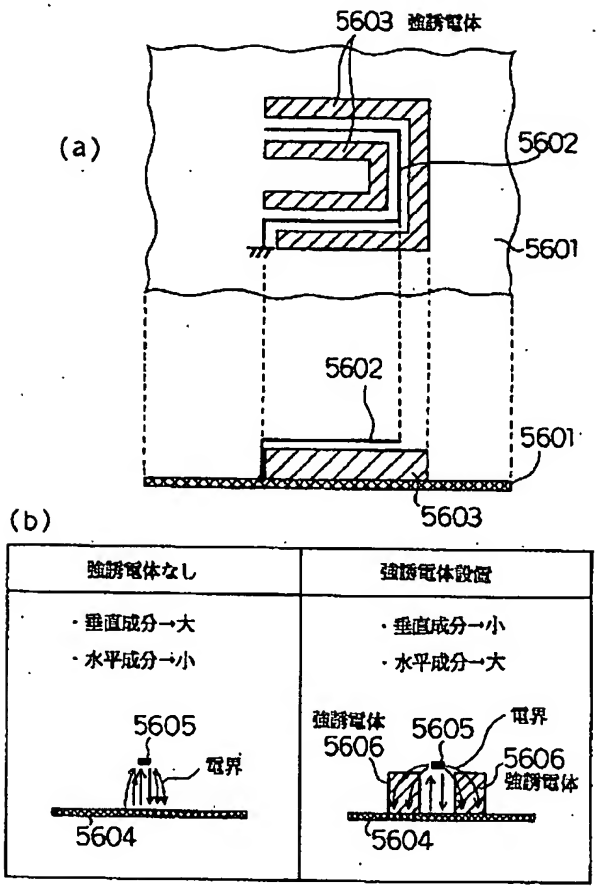
[Drawing 54]



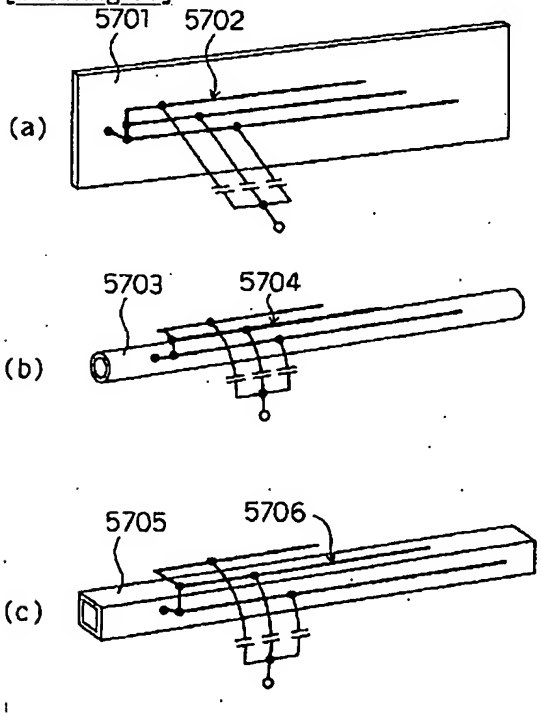
[Drawing 55]



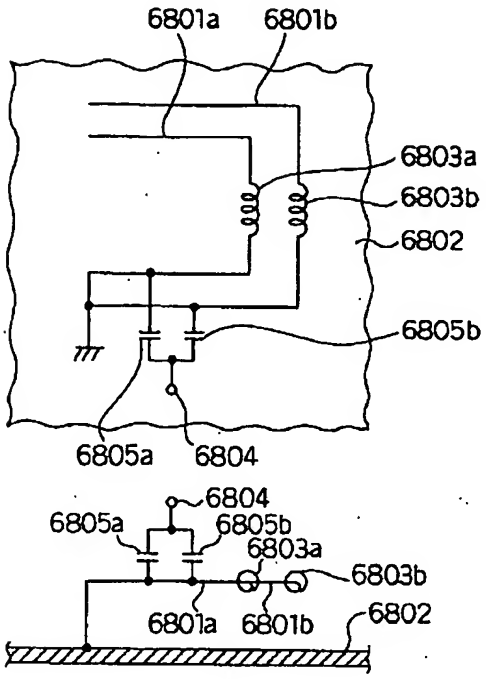
[Drawing 56]



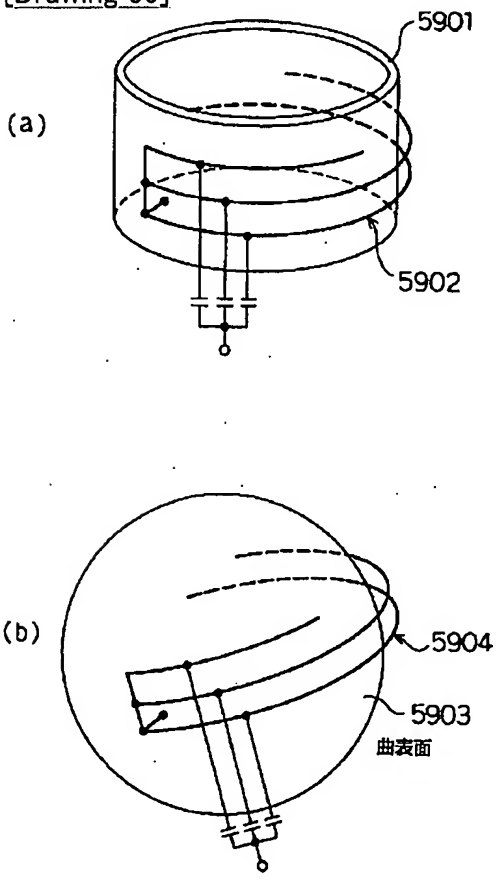
[Drawing 57]



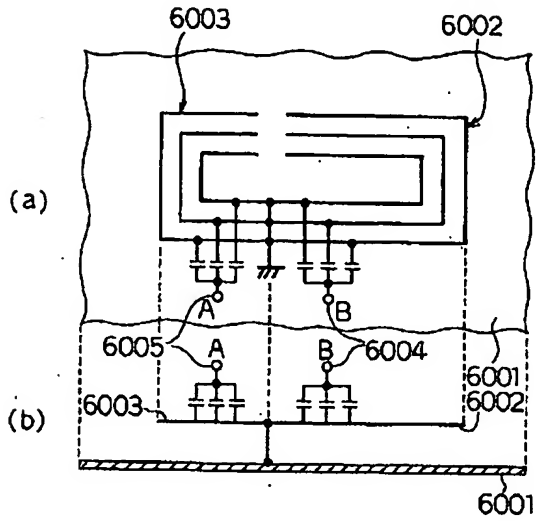
[Drawing 68]



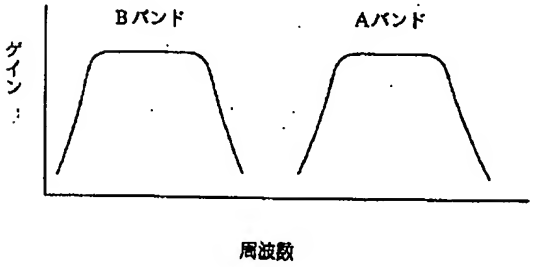
[Drawing 59]



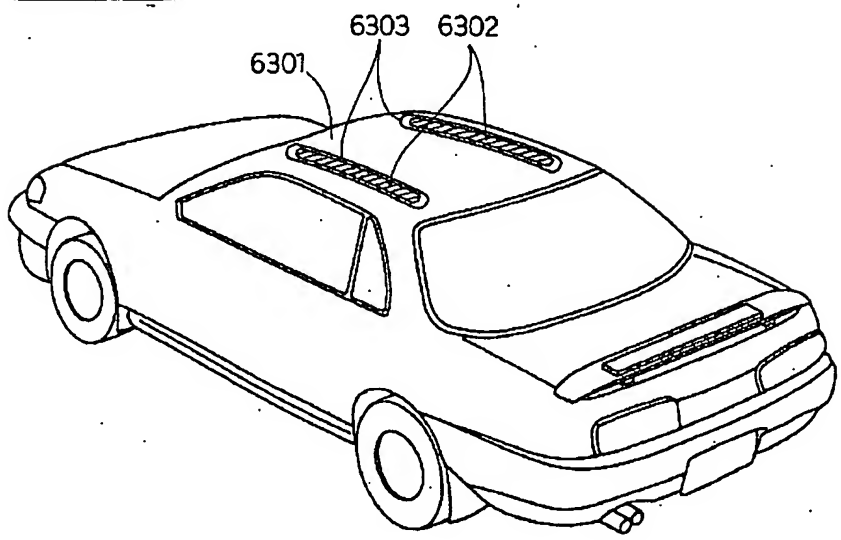
[Drawing 60]



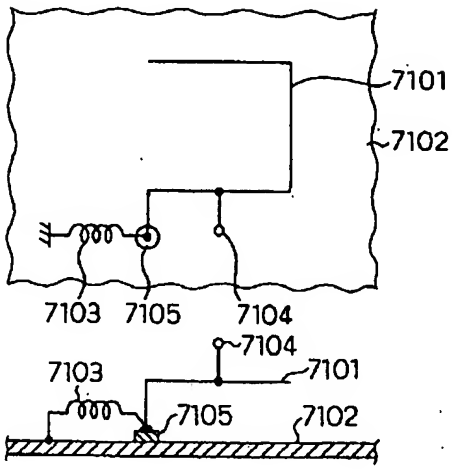
(c)



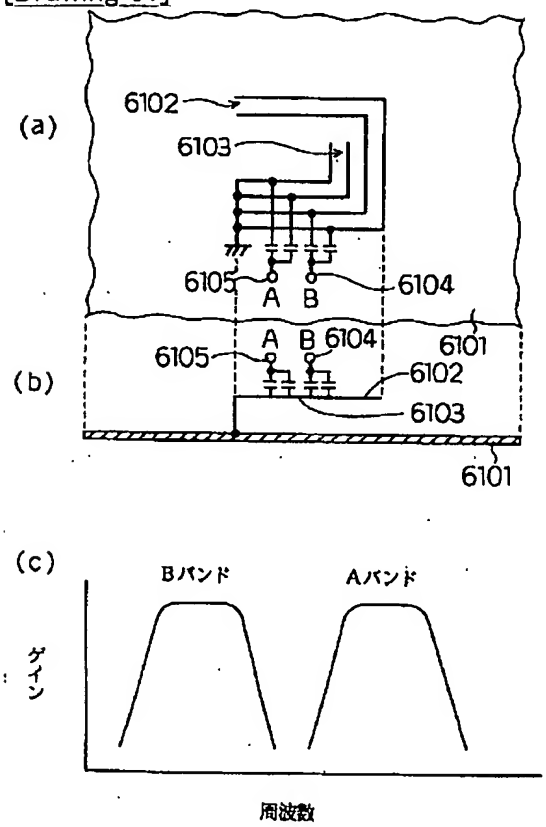
[Drawing 63]



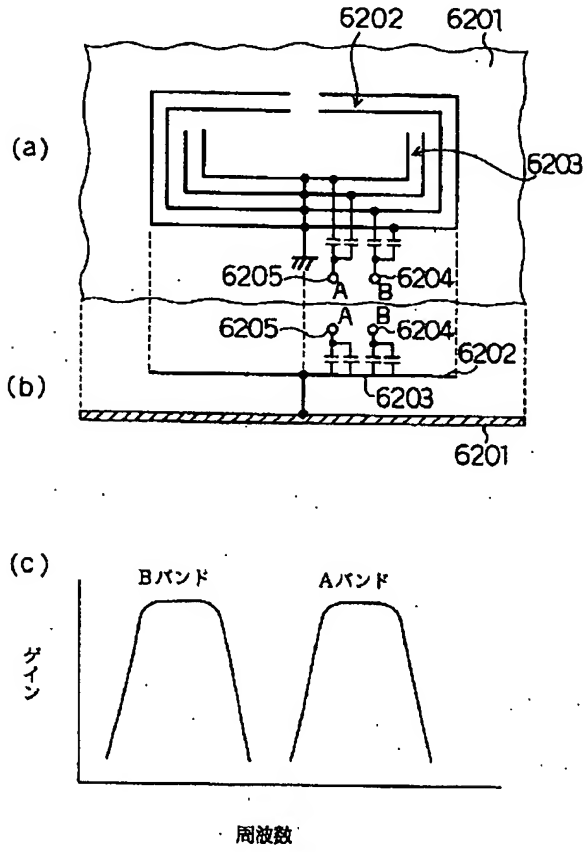
[Drawing 71]



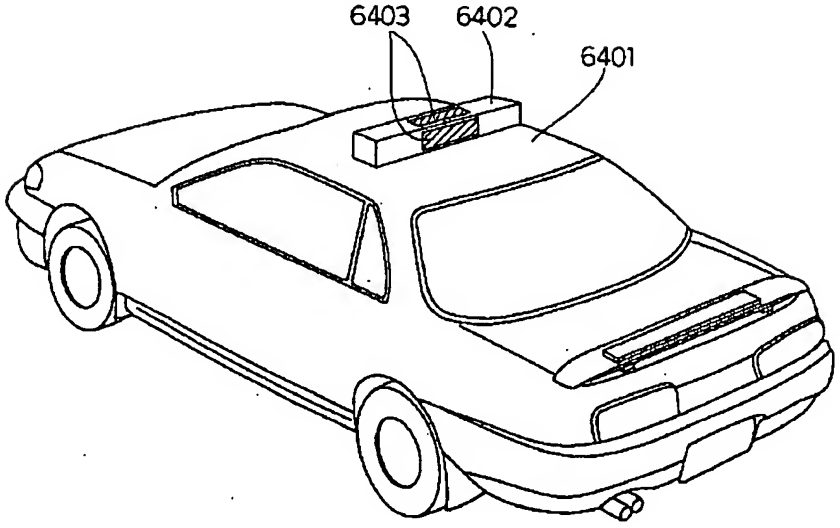
[Drawing 61]



[Drawing 62]



[Drawing 64]



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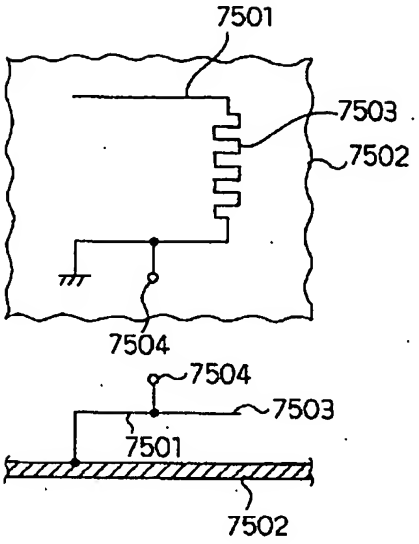
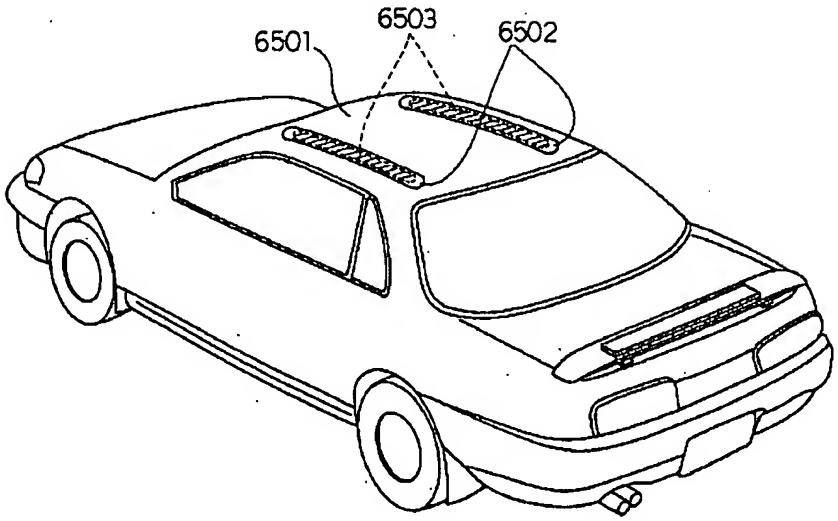
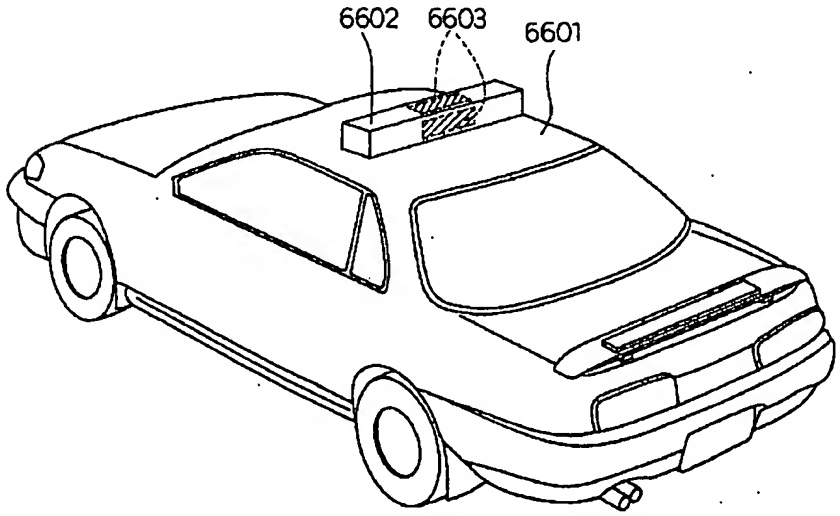


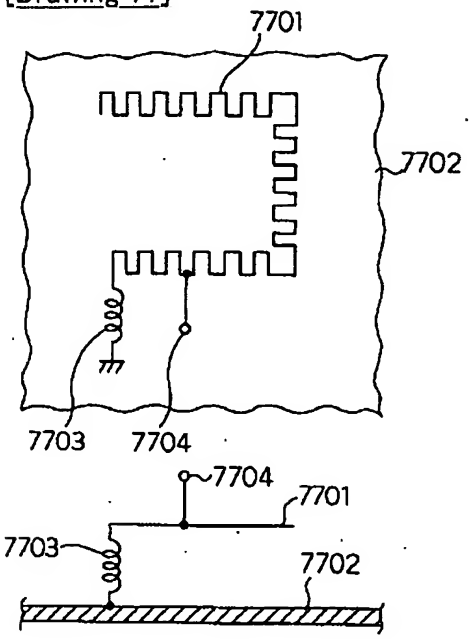
[Drawing 65]



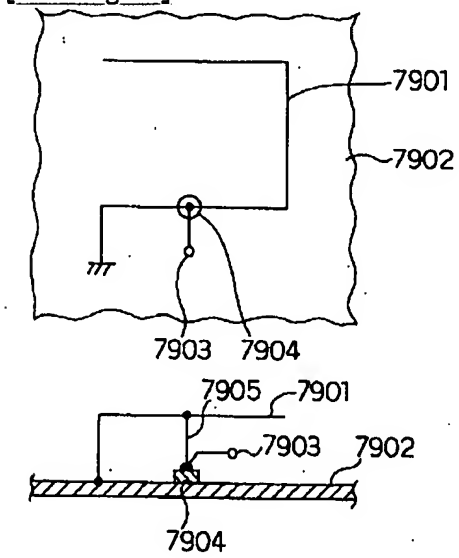
[Drawing 66]



[Drawing 77]



[Drawing 79]



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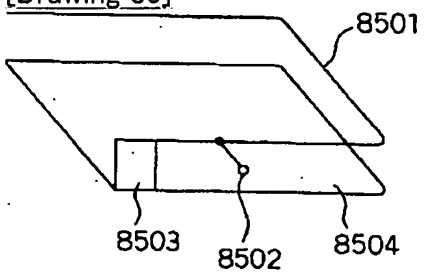
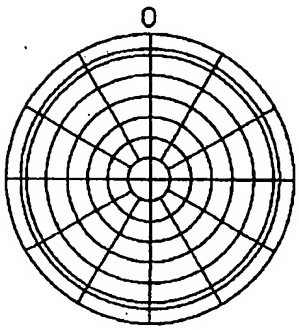
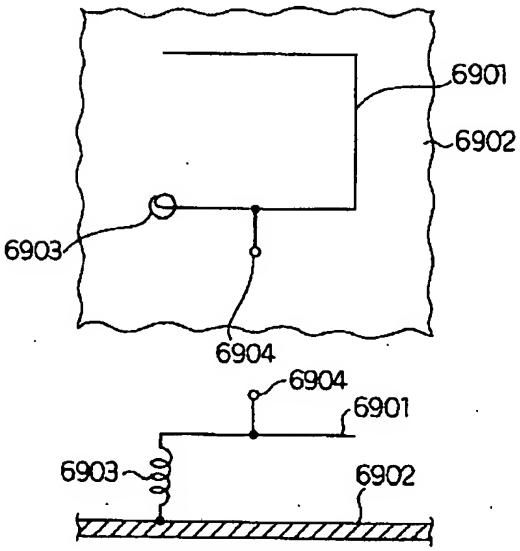


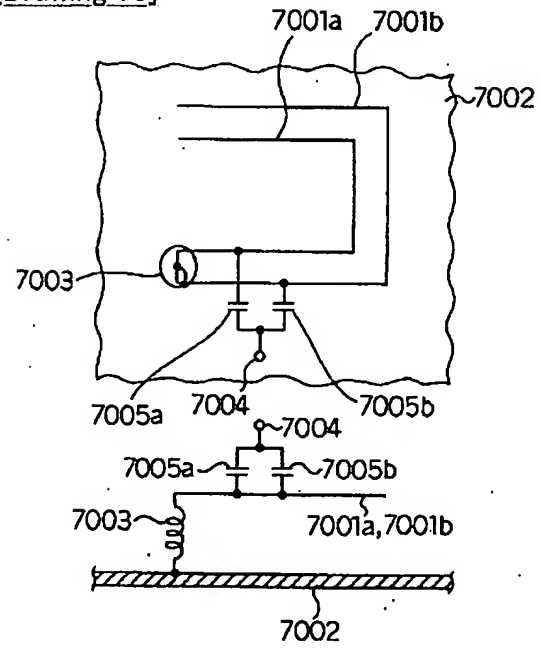
[Drawing 87]



[Drawing 69]



[Drawing 70]



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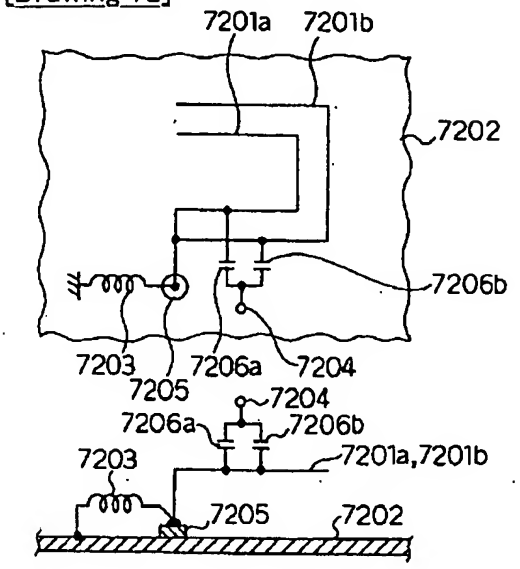
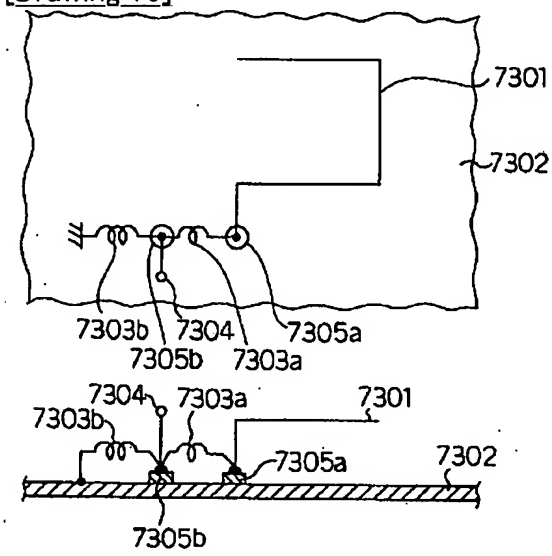
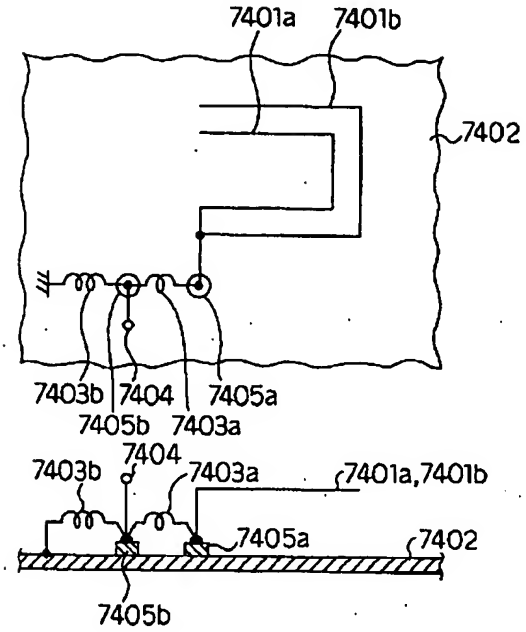


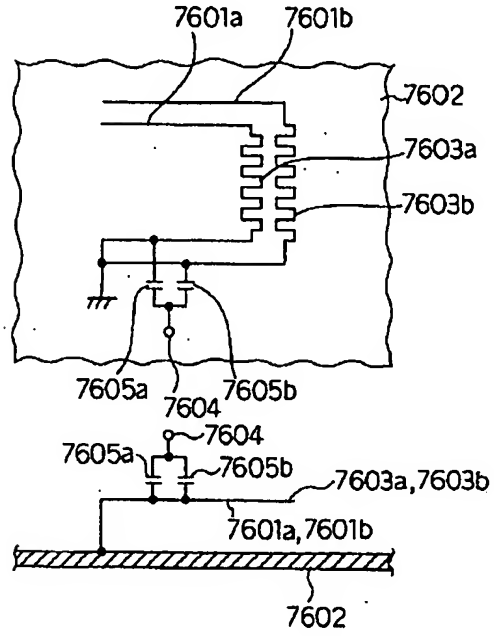
[Drawing 73]



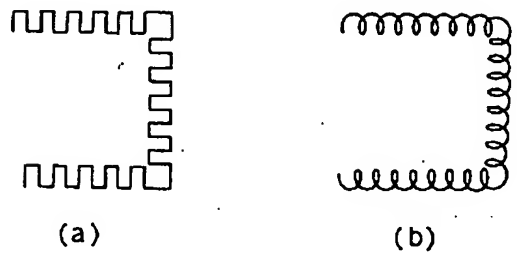
[Drawing 74]

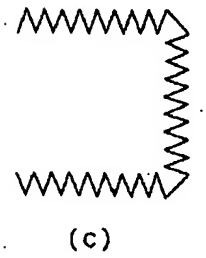


[Drawing 76]

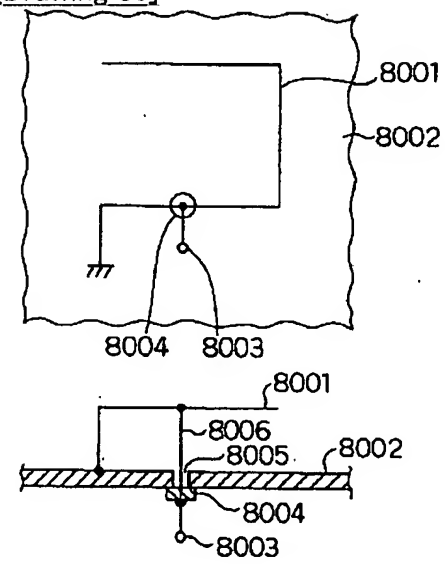


[Drawing 78]





[Drawing 80]



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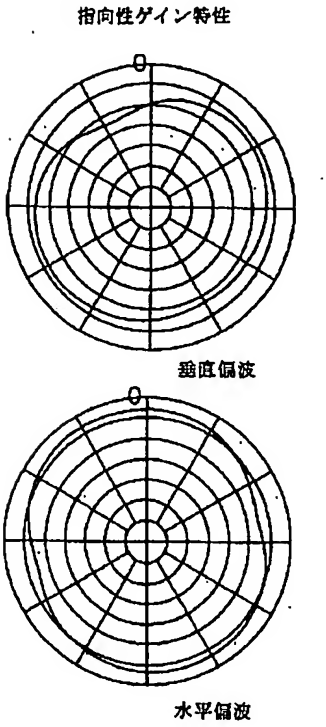
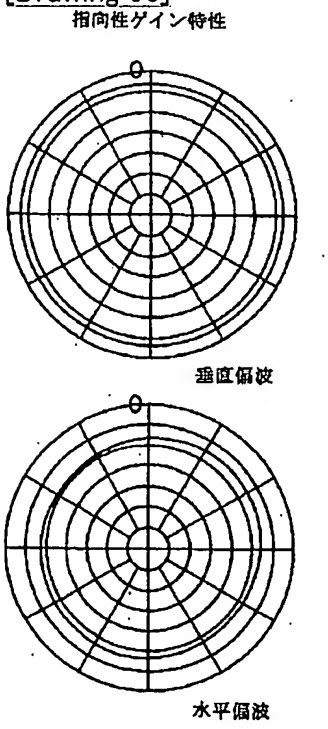


[Drawing 96]



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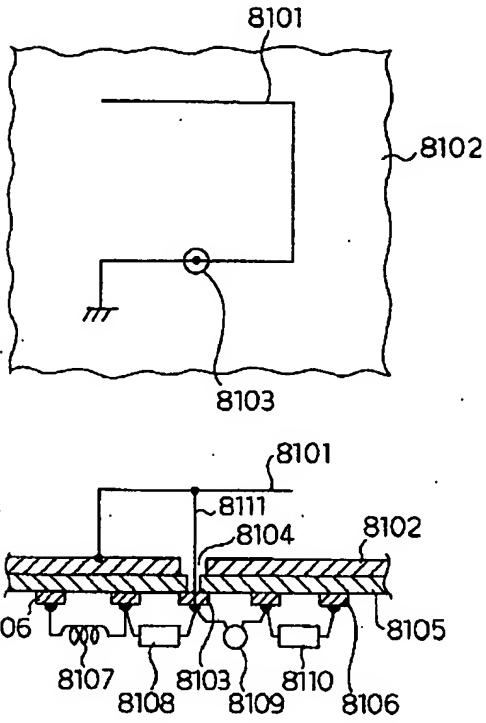

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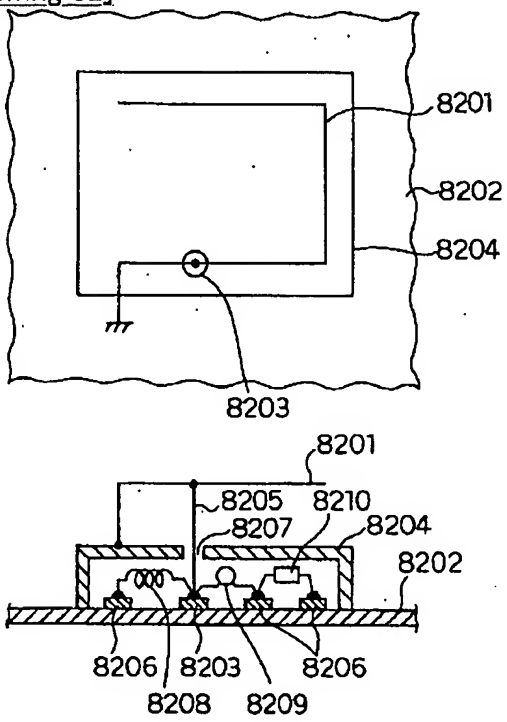

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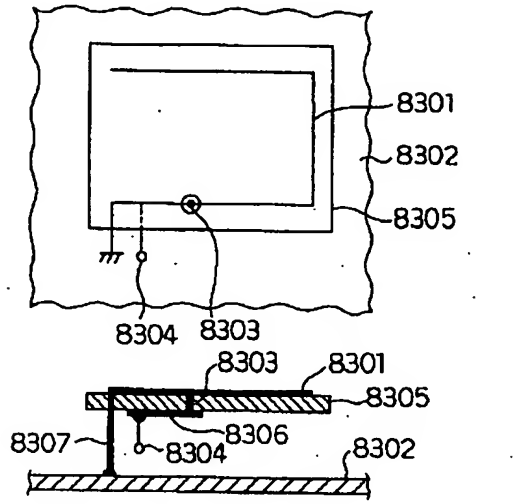

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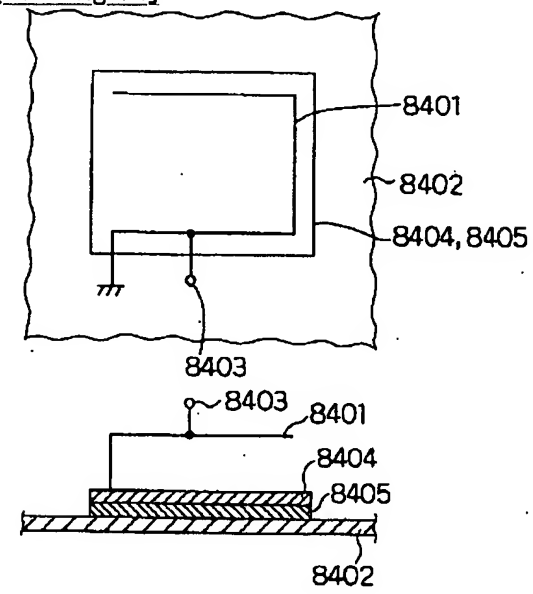

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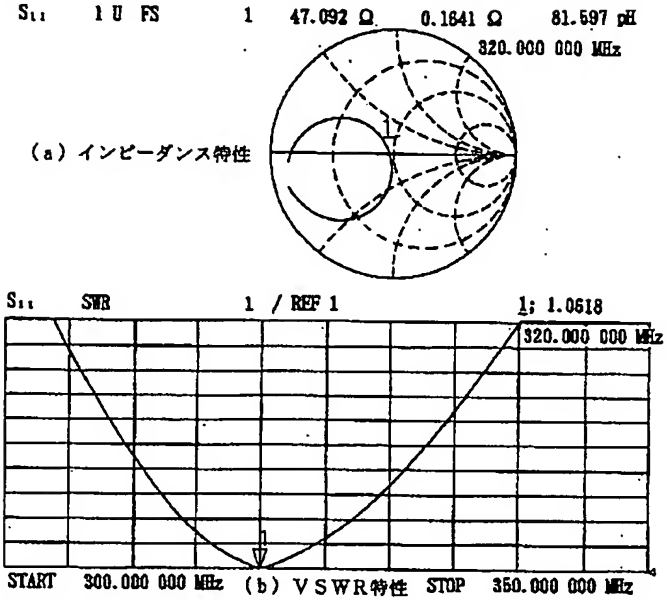
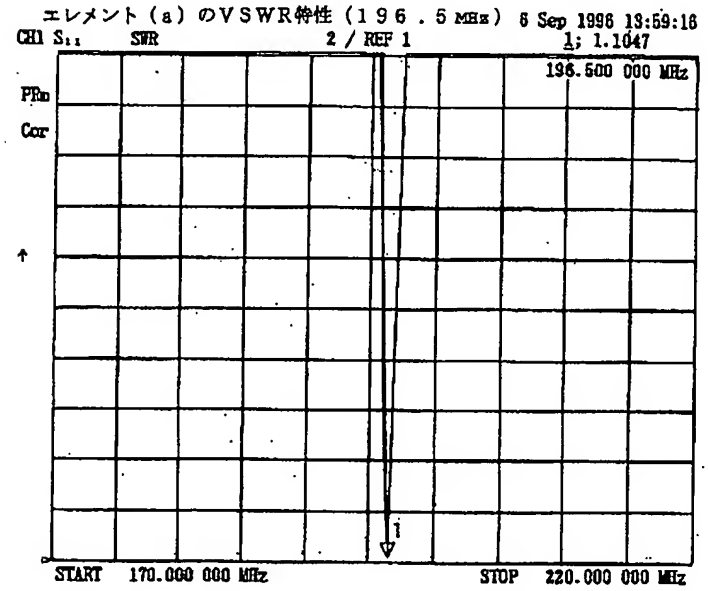


（a）インピーダンス特性

（b）ＶＳＷＲ特性

[Drawing 88]



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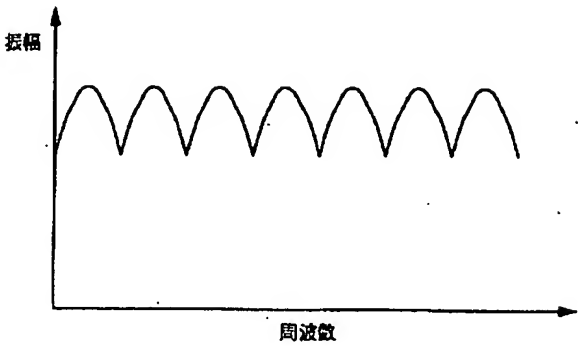

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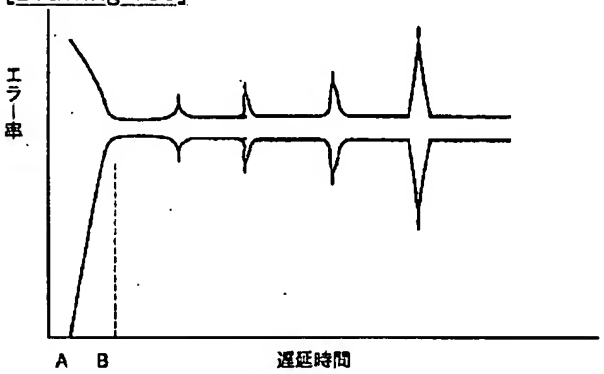

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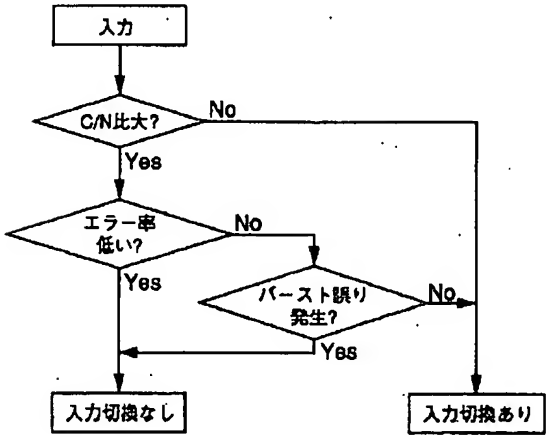

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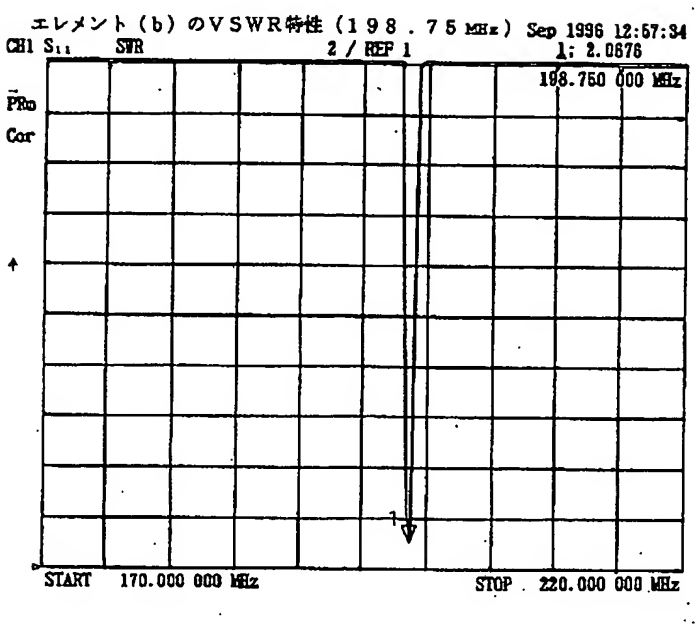

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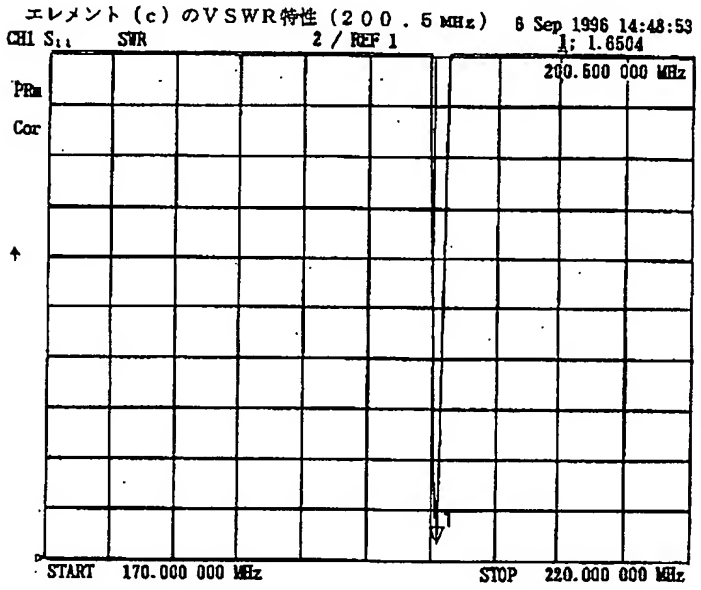

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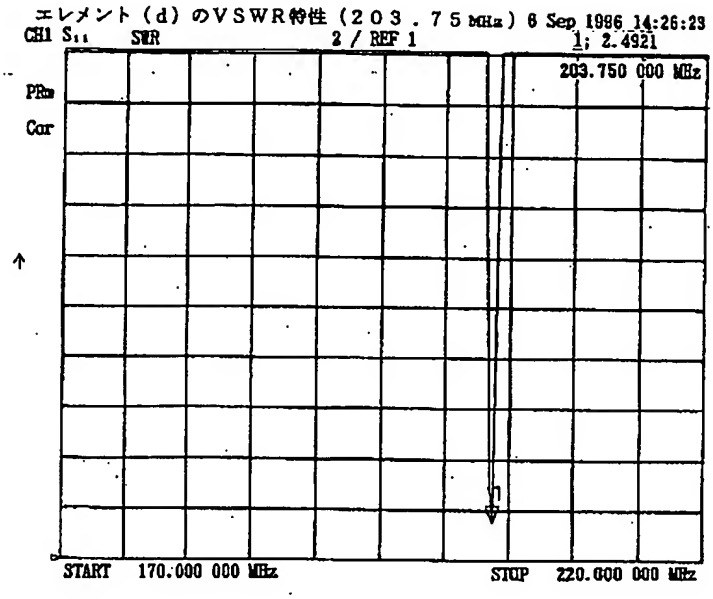

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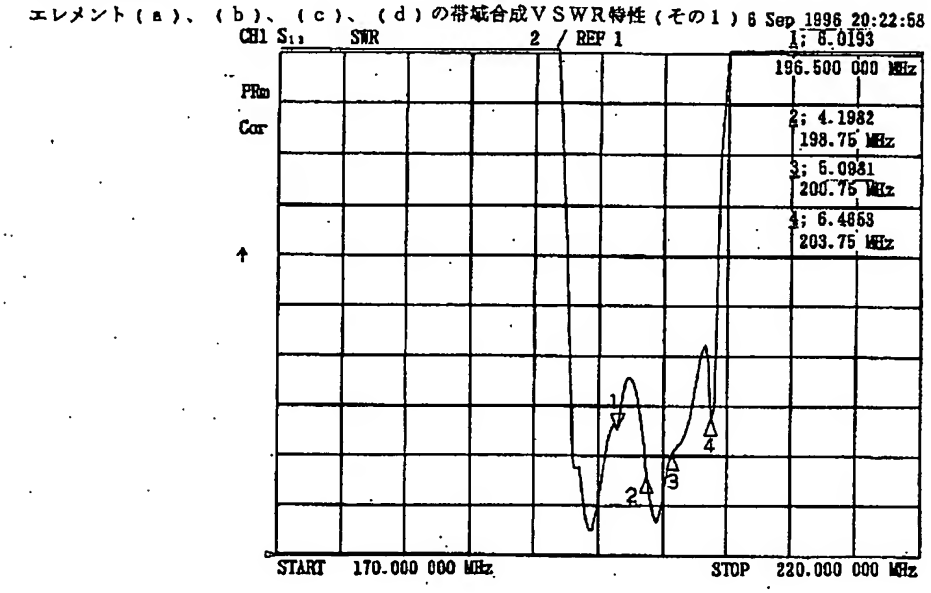

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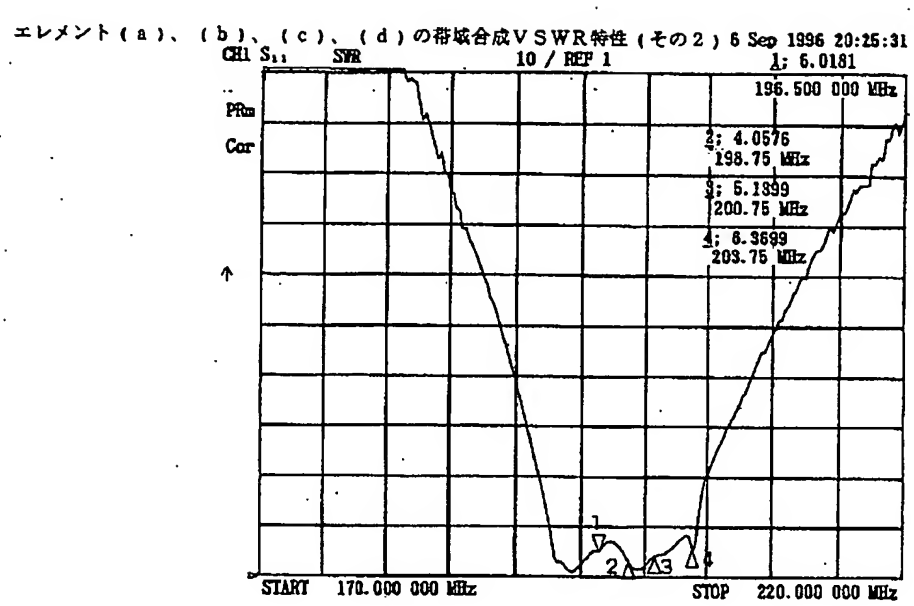

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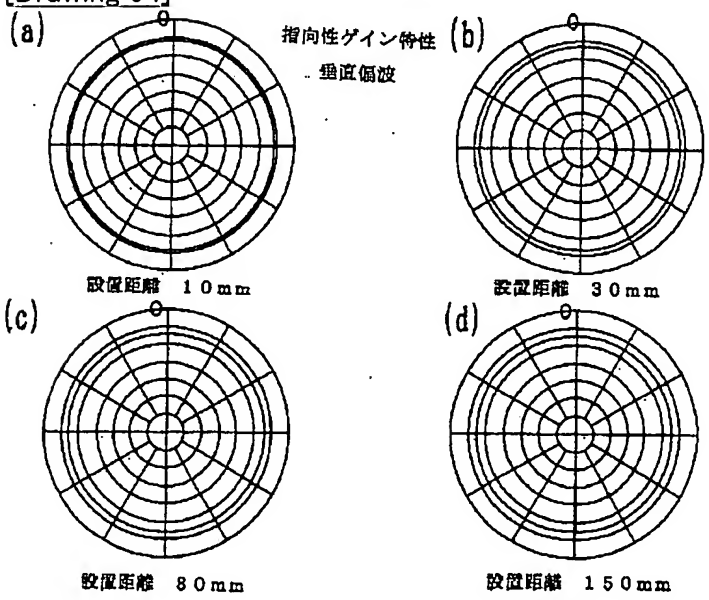

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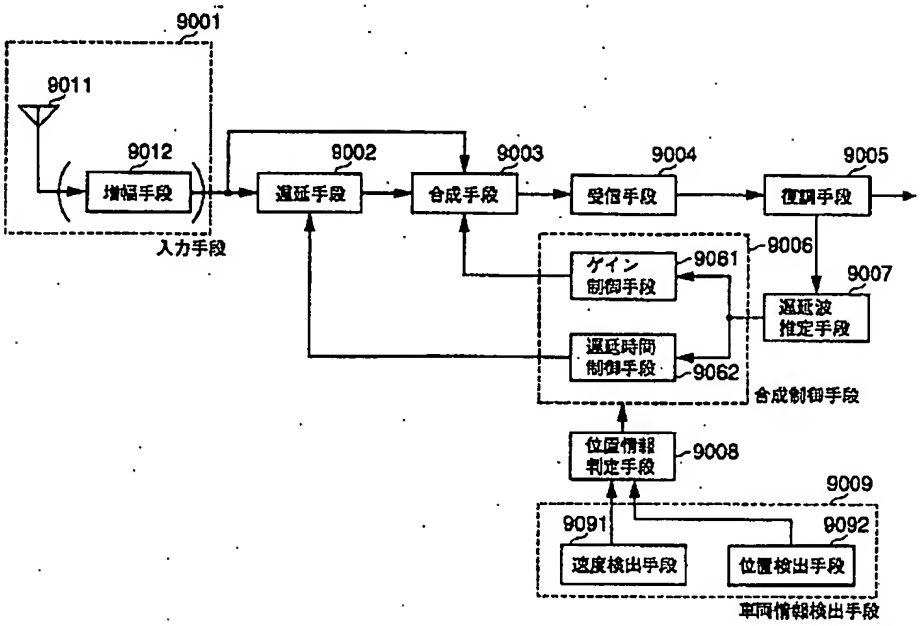

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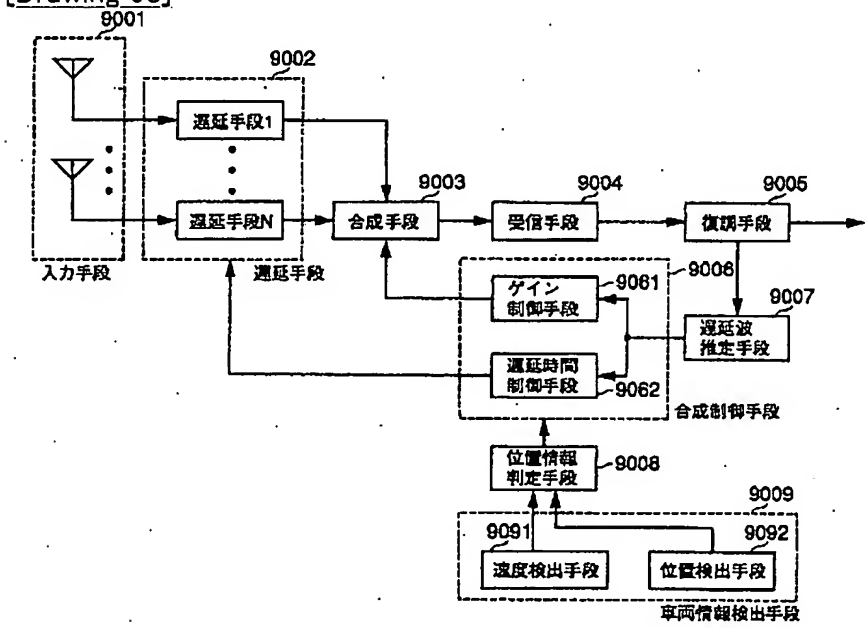

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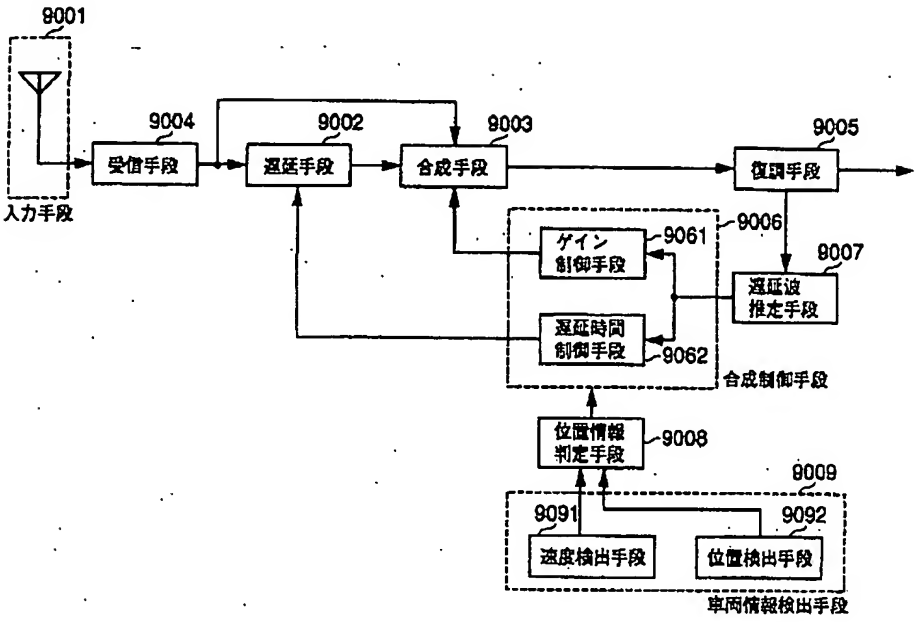

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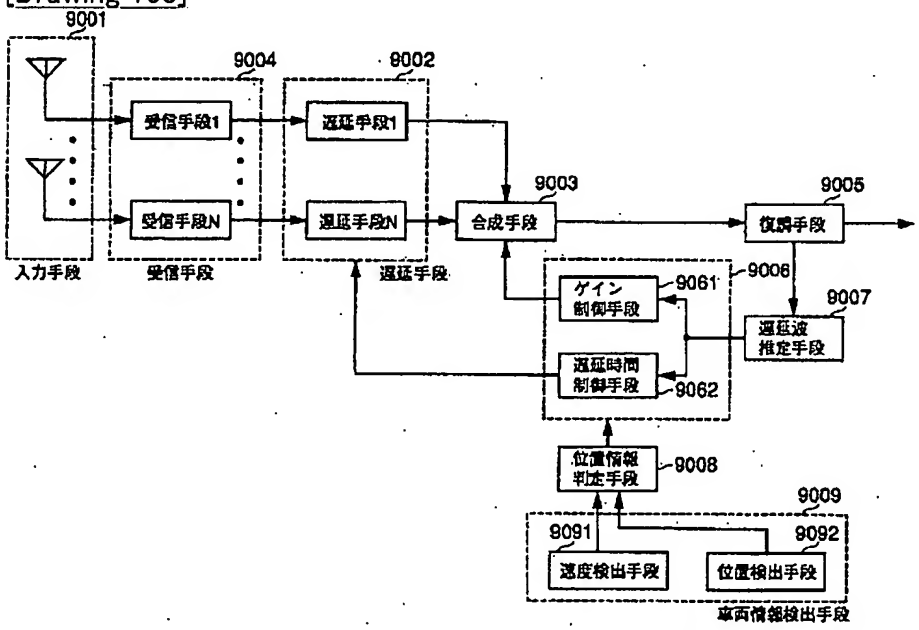

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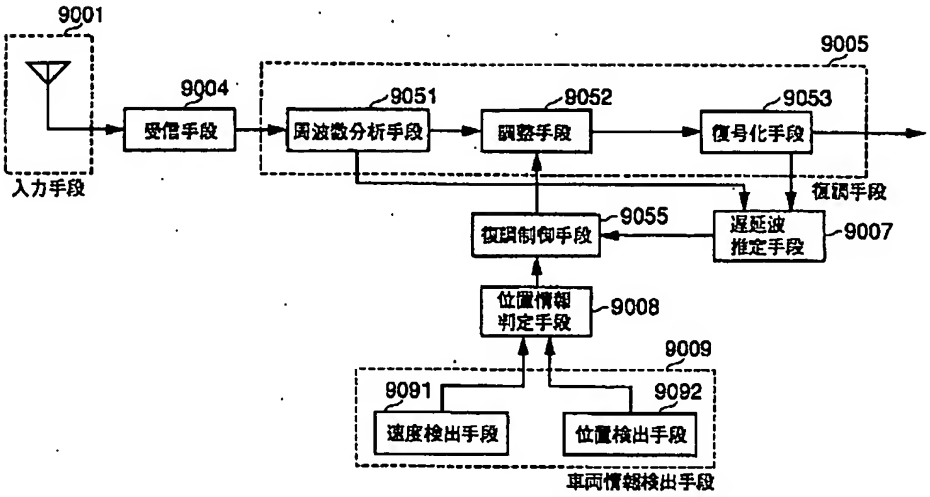

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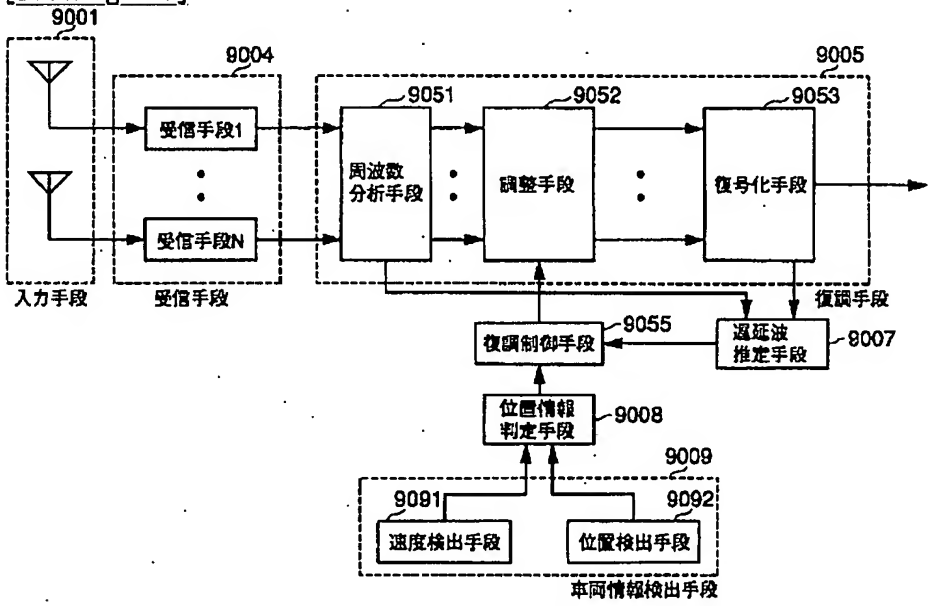

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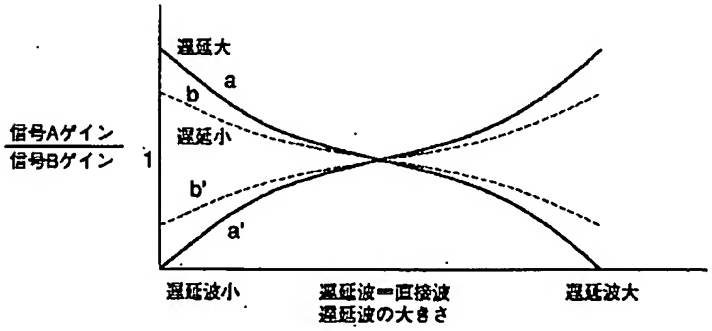

[Translation done.]

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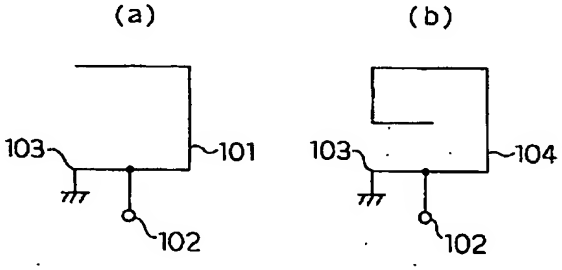
(54)【発明の名称】　デジタルテレビジョン放送受信装置

(57)【要約】
【課題】従来、自動車などの車体近傍に、あるいは車体と一体化して平面上に設置でき、かつ狭い場所でも配置ができるように小型化が可能であるアンテナ装置を備え、且つデジタルデータの移動受信における受信障害の改善を図りうるデジタルテレビジョン放送受信装置を実現すること。
【解決手段】１箇所以上の屈曲部を持つ線状導電体１０１が、給電部１０２に対して１つ以上存在するアンテナ装置である入力手段と、入力手段からの信号を遅延させる遅延手段と、遅延手段から得られた信号と入力手段から得られた信号とを合成する合成手段と、合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、遅延波推定手段から得られる信号に応じて合成手段および遅延手段を制御する合成制御手段とを具備し、合成制御手段の信号に応じて合成手段の合成率と遅延手段の遅延時間とを制御するデジタルテレビジョン放送受信装置。



1

【特許請求の範囲】

【請求項１】少なくとも１箇所以上の屈曲部もしくは湾曲部を持つ線状導電体が、給電部に対して１つ、又は２つ以上存在するアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項２】少なくとも１箇所以上の屈曲部もしくは湾曲部を持つ線状導電体が、給電部に対して１つ、又は２つ以上存在するアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項３】　屈曲部若しくは湾曲部は、４箇所以上の偶数箇所であることを特徴とする請求項１または、２記載のディジタルテレビジョン放送受信装置。

【請求項４】　スパイラル形状の線状導電体が、給電部に対して１つ、又は２つ以上存在するアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項５】　スパイラル形状の線状導電体が、給電部に対して１つ、又は２つ以上存在するアンテナ装置である入力手段と、前記入力手段から得られる信号の周波

2

数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項６】　線状導電体が前記給電部に対して２つ存在し、その２つの線状導電体の、屈曲する、湾曲するあるいはスパイラルを形成する捲回方向が、互いに前記給電部からみて同じ方向であることを特徴とする請求項１、２、３、４、又は５記載のディジタルテレビジョン放送受信装置。

【請求項７】　線状導電体が前記給電部に対して２つ存在し、その２つの線状導電体の、屈曲する、湾曲するあるいはスパイラルを形成する捲回方向が、互いに前記給電部からみて異なる方向であることを特徴とする請求項１、２、３、４、又は５記載のディジタルテレビジョン放送受信装置。

【請求項８】　給電部から第１屈曲点もしくは湾曲点までの長さが、前記第１屈曲点もしくは湾曲点から第２屈曲点もしくは湾曲点までの長さより、相対的に長いあるいは短いことを特徴とする請求項１又は２記載のディジタルテレビジョン放送受信装置。

【請求項９】　導電体地板近傍に配置され、アンテナのアース端子と前記導電体地板とが接続されていることを特徴とするディジタルテレビジョン放送受信装置。

【請求項１０】　導電体地板近傍に配置され、アンテナのアース端子と前記導電体地板との間にスイッチング素子が設けられているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項１１】　導電体地板近傍に配置され、アンテナのアース端子と前記導電体地板との間にスイッチング素子が設けられているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に

変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項１２】　アンテナの給電端子が前記導電体地板を貫通し、前記アンテナが設置されている反対側から給電されていることを特徴とする請求項９、１０又は１１に記載のディジタルテレビジョン放送受信装置。

【請求項１３】　スイッチング素子を利用して、前記アンテナのアース端子と前記導電体地板との接続切換制御を行うことにより、所望の指向性あるいは偏波面を得ることを特徴とする請求項１０又は１１に記載のディジタルテレビジョン放送受信装置。

【請求項１４】　スイッチング素子をオンすることにより、最大効率を得る偏波面が水平偏波となることを特徴とする請求項１０又は１１に記載のディジタルテレビジョン放送受信装置。

【請求項１５】　スイッチング素子をオフすることにより、最大効率を得る偏波面が垂直偏波となることを特徴とする請求項１０又は１１に記載のディジタルテレビジョン放送受信装置。

【請求項１６】　スイッチング素子の接続切換は、遠隔制御できることを特徴とする請求項１０～１５のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項１７】　アンテナと前記導電体地板との距離を変化させることにより、前記アンテナの特性を所要の特性に制御することを特徴とする請求項９～１２のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項１８】　アンテナ平面と前記導電体地板平面とのなす角度を変化させることにより、前記アンテナの特性を所望の特性に制御することを特徴とする請求項９～１２のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項１９】　アンテナと前記導電体地板との間にスペーサが挿入され、そのスペーサは低誘電率材料から構成されていることを特徴とする請求項９～１８のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項２０】　導電体地板が、移動体の一部、建築物の一部、構造物の一部、あるいは無線利用装置の一部であることを特徴とする請求項９～１９のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項２１】　複数のアンテナ素子を単一給電部で単一化したアンテナ素子群で、アンテナが構成されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。ことを特徴とするディジタルテレビジョン放送受信装置。

【請求項２２】　複数のアンテナ素子を単一給電部で単一化したアンテナ素子群で、アンテナが構成されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項２３】　複数のアンテナ素子の所定位置にタップが形成され、それらを合わせて前記単一給電部が構成されていることを特徴とする請求項２１又は２２記載のディジタルテレビジョン放送受信装置。

【請求項２４】　複数のアンテナ素子は、同調周波数が同一であり、所定のアンテナ効率が得られていることを特徴とする請求項２１、２２又は２３に記載のディジタルテレビジョン放送受信装置。

【請求項２５】　複数のアンテナ素子は、目標とする周波数帯を分割した複数の分割帯域にそれぞれ対応するアンテナであって、前記それらのアンテナ素子群により所望帯域化が実現されていることを特徴とする請求項２１、２２、又は２３に記載のディジタルテレビジョン放送受信装置。

【請求項２６】　個々のアンテナ素子の同調周波数は所定の間隔をもって設定されていることを特徴とする請求項２５に記載のディジタルテレビジョン放送受信装置。

【請求項２７】　カバーする周波数帯域は、各アンテナ素子の単一の場合の同調周波数よりも上側、あるいは下側に設定されていることを特徴とする請求項２１、２２又は２３に記載のディジタルテレビジョン放送受信装置。

【請求項２８】　接続するアンテナ素子数を所定の数に設定制御することにより、設定する帯域の幅が調整されることを特徴とする請求項２１、２２又は２３に記載のディジタルテレビジョン放送受信装置。

【請求項２９】　各アンテナ素子の配置状態は、前記複

数のアンテナ素子のうちいずれか１つのアンテナ平面を基準平面上として、その基準平面内で各アンテナが近接あるいは集中して配置されているか、又は各アンテナ平面が層状となるように前記基準平面に対して垂直な方向に配置されているか、又は各アンテナ平面が垂直な方向に、かつ水平方向にずれて配置されているかのいずれかであることを特徴とする請求項２１、２２又は２３に記載のディジタルテレビジョン放送受信装置。

【請求項３０】　アンテナ素子長が長いものが相対的に低い同調周波数に、短いものが相対的に高い同調周波数に設定されていることを特徴とする請求項２１、２２又は２３に記載のディジタルテレビジョン放送受信装置。

【請求項３１】　アンテナ素子長が長いものが相対的に外側に、短いものが相対的に内側に配置されていることを特徴とする請求項２１、２２又は２３に記載のディジタルテレビジョン放送受信装置。

【請求項３２】　アンテナの給電部に平衡不平衡変換器が使用されていることを特徴とする請求項２１、２２又は２３に記載のディジタルテレビジョン放送受信装置。

【請求項３３】　アンテナの給電部に能動素子あるいは増幅素子が接続されていることを特徴とする請求項２１、２２又は２３に記載のディジタルテレビジョン放送受信装置。

【請求項３４】　アンテナの給電部に、インピーダンス変換器が使用されているか、片側をアースとし片側を給電端とするコイルが近接配置されているか、あるいはバランスコイルが近接配置されていることを特徴とする請求項２１、２２又は２３に記載のディジタルテレビジョン放送受信装置。

【請求項３５】　各アンテナ素子の給電部にアイソレータが使用されていることを特徴とする請求項２１、２２又は２３に記載のディジタルテレビジョン放送受信装置。

【請求項３６】　タップをとる方向がアンテナ素子毎に任意に設定されることを特徴とする請求項２３に記載のディジタルテレビジョン放送受信装置。

【請求項３７】　給電端子からそれぞれのアンテナ素子のタップ位置までの電極が共通化されていることを特徴とする請求項２３に記載のディジタルテレビジョン放送受信装置。

【請求項３８】　共通化した前記電極が前記アンテナ素子に平行に配置されていることを特徴とする請求項３７に記載のディジタルテレビジョン放送受信装置。

【請求項３９】　リアクタンス素子、あるいは可変リアクタンス素子を介して、各アンテナ素子のタップがとられていることを特徴とする請求項２３に記載のディジタルテレビジョン放送受信装置。

【請求項４０】　各アンテナ素子のリアクタンス値を調整することにより、所定のインピーダンス、所定の帯域、所定の指向性あるいは最大効率が得られることを特

徴とする請求項３９に記載のディジタルテレビジョン放送受信装置。

【請求項４１】　アンテナ素子のオープン端子側の対向する部分の結合が設定されていることにより、同調周波数が制御されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項４２】　アンテナ素子のオープン端子側の対向する部分の結合が設定されていることにより、同調周波数が制御されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項４３】　アンテナ素子のオープン端子側と、中性点、あるいは中性点近傍の対向する部分との結合が設定されていることにより、同調周波数が制御されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。ことを特徴とするディジタルテレビジョン放送受信装置。

【請求項４４】　アンテナ素子のオープン端子側と、中性点、あるいは中性点近傍の対向する部分との結合が設

定されていることにより、同調周波数が制御されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項４５】　対向する部分の結合の設定を、その間に所定の距離を設けることで行うことを特徴とする請求項４１、４２、４３又は４４に記載のディジタルテレビジョン放送受信装置。

【請求項４６】　対向する部分の結合の設定を、その間に集中定数を接続することで行うことを特徴とする請求項４１、４２、４３又は４４に記載のディジタルテレビジョン放送受信装置。

【請求項４７】　コイルの両極にそれぞれ少なくとも１つ以上の線状導電体を接続し、コイルの中性点からアース端子を、また各線状導電体あるいはコイルの所定の位置からタップを形成し、そこから給電端子が取り出されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項４８】　コイルの両極にそれぞれ少なくとも１つ以上の線状導電体を接続し、コイルの中性点からアース端子を、また各線状導電体あるいはコイルの所定の位置からタップを形成し、そこから給電端子が取り出されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項４９】　少なくとも１つ以上の線状導電体が、コイルを介して、給電部に対して１つ、又は２つ設けられているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項５０】　少なくとも１つ以上の線状導電体が、コイルを介して、給電部に対して１つ、又は２つ設けられているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項５１】　各アンテナ素子が、同一基板上又は多層基板上にプリント配線により形成されていることを特徴とする請求項１、２～４９、又は５０のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項５２】　複数のアンテナの中から、１つ、又は２つ以上のアンテナを選択する制御を行うことを特徴とする請求項１～５１のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項５３】　アンテナを選択する制御において、受信機入力最大のアンテナを選択する制御を行うことを特徴とする請求項５２に記載のディジタルテレビジョン放送受信装置。

【請求項５４】　アンテナを選択する制御において、マルチパス妨害レベル最小のアンテナを選択する制御を行うことを特徴とする請求項５２に記載のディジタルテレビジョン放送受信装置。

【請求項５５】　アンテナ素子を導電体地板の凹部に設けたことを特徴とする請求項１～５４のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項５６】　導電体地板が、メッシュ状あるいは１個以上の貫通孔を設けた板であることを特徴とする請求項９～２０のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項５７】　所定箇所が接地された主のアンテナ素子と、その主のアンテナ素子に近接配置され、前記主のアンテナ素子より相対的に短く、両端が接地されていない１個以上のアンテナ素子と、前記主のアンテナ素子に近接配置され、前記主のアンテナ素子より相対的に長く、両端が接地されていない１個以上のアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項５８】　所定箇所が接地された主のアンテナ素子と、その主のアンテナ素子に近接配置され、前記主のアンテナ素子より相対的に短く、両端が接地されていない１個以上のアンテナ素子と、前記主のアンテナ素子に近接配置され、前記主のアンテナ素子より相対的に長く、両端が接地されていない１個以上のアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項５９】　アンテナ素子が、モノポールタイプあるいはダイポールタイプであることを特徴とする請求項５７又は５８記載のディジタルテレビジョン放送受信装置。

【請求項６０】　各アンテナ素子は、プリント基板上にプリント配線方法を用いて形成されたものであることを特徴とする請求項５７、５８又は５９記載のディジタルテレビジョン放送受信装置。

【請求項６１】　導電体地板の大きさが、前記アンテナ素子面の大きさと実質上同じか、あるいはそれ以下であることを特徴とする請求項９記載のディジタルテレビジョン放送受信装置。

【請求項６２】　導電体地板が、その導電体地板の近傍の他のアース部材と接続されていないことを特徴とする請求項６１記載のディジタルテレビジョン放送受信装置。

【請求項６３】　導電体地板と、前記アンテナ素子との間の距離を、アンテナの共振周波数ｆにおける波長λに対して、０．０１～０．２５倍（０．０１～０．２５λ）に設定することを特徴とする請求項９～２０のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項６４】　アンテナ素子が複数配置されている場合は、各々のアンテナ素子毎に、前記導電体地板と、前記各アンテナ素子との間の距離を、各アンテナの共振周波数ｆにおける波長λに対して、０．０１～０．２５倍（０．０１～０．２５λ）に設定することを特徴とする請求項９～２０のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項６５】　導電体地板と前記アンテナ素子との間に、高誘電率部材を配置することを特徴とする請求項９～２０のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項６６】　複数のアンテナは、自動車の車体ピラー部及びルーフ部の複数の箇所に設置され、それら複数のアンテナでダイバーシティ構成とすることを特徴とする請求項５２記載のディジタルテレビジョン放送受信装置。

【請求項６７】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板の少なくとも前記アンテナ素子に対向する領域が前記アンテナ素子よりも通信相手側に配置されていることを特徴とするディジタルテレビジョン放送受信装置。

【請求項６８】　導電体地板は、前記アンテナ素子の周囲を実質上取り囲んでいることを特徴とする請求項６７記載のディジタルテレビジョン放送受信装置。

【請求項６９】　導電体地板が、移動体、建築物、構造物、及び無線利用装置のいずれかの一部であることを特徴とする請求項６７又は６８記載のディジタルテレビジョン放送受信装置。

【請求項７０】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子と、前記導電体地板及び前記アンテナ素子をその配置状態のまま回動させる回動手段とを備えたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも

一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項７１】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子と、前記導電体地板及び前記アンテナ素子をその配置状態のまま回動させる回動手段とを備えたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項７２】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子と、前記導電体地板と前記アンテナ素子との間であって、前記アンテナ素子の周辺に設置された強誘電体とを備えたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項７３】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子と、前記導電体地板と前記アンテナ素子との間であって、前記アンテナ素子の周辺に設置された強誘電体とを備えたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項７４】　強誘電体が移動可能であることを特徴とする請求項７２又は７３記載のディジタルテレビジョン放送受信装置。

【請求項７５】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記アンテナ素子が、前記導電体地板の形状に合わせた形状に形成されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項７６】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記アンテナ素子が、前記導電体地板の形状に合わせた形状に形成されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項７７】　アンテナ素子は、前記導電体地板の内側に配置されていることを特徴とする請求項７５又は７６記載のディジタルテレビジョン放送受信装置。

【請求項７８】　導電体地板と、その導電体地板にアース部が接続され、複数バンドの同調周波数に対応して近接配置された長さの異なる複数のアンテナ素子と、その複数のアンテナ素子のそれぞれに設けられた複数の給電部とをアンテナ装置である電磁波を電気信号に変換する入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なく

とも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項７９】　導電体地板と、その導電体地板にアース部が接続され、複数バンドの同調周波数に対応して近接配置された長さの異なる複数のアンテナ素子と、その複数のアンテナ素子のそれぞれに設けられた複数の給電部とを有するアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項８０】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板は、車の実質上垂直壁を形成する部分であり、そのアンテナ素子の電界は実質上水平に形成されるアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項８１】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板は、車の実質上垂直壁を形成する部分であり、そのアンテナ素子の電界は実質上水平に形成されるアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項８２】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板は、車の実質上水平壁を形成する部分であり、そのアンテナ素子の電界は実質上垂直に形成されたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項８３】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板は、車の実質上水平壁を形成する部分であり、そのアンテナ素子の電界は実質上垂直に形成されたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項８４】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板は、移動体装置のハウジング壁の一部であり、そのアンテナ素子は前記ハウジング壁の内部側に配置されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項８５】　導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板は、移動体装置のハウジング壁の一部であり、そのアンテナ素子は前記ハウジング壁の内部

側に配置されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項８６】　導電体地板と、その導電体地板に近接配置されたアンテナ素子とを備え、前記アンテナ素子の所定部分はコイル、あるいはジグザグ形状の導体で形成されており、前記アンテナ素子の一端が前記導電体地板に接地されていることを特徴とするディジタルテレビジョン放送受信装置。

【請求項８７】　前記コイル、あるいはジグザグ形状の導体が前記アンテナ素子の端部に形成されている場合であって、前記コイル、あるいはジグザグ形状の導体と前記アンテナ素子の他の部分とを、前記導電体地板上に設けられた絶縁体上で接続することを特徴とする請求項８６に記載のディジタルテレビジョン放送受信装置。

【請求項８８】　導電体地板と、その導電体地板に近接して配置された長さの異なる２本以上のアンテナ素子とを備え、前記アンテナ素子のそれぞれの所定部分はコイル、あるいはジグザグ形状の導体で形成されており、前記アンテナ素子の各一端が共通して前記導電体地板に接地されていることを特徴とするディジタルテレビジョン放送受信装置。

【請求項８９】　導電体地板と、その導電体地板に近接して配置された長さの異なる２本以上のアンテナ素子と、それらアンテナ素子の各一端の共通接続点に接続されたコイル、あるいはジグザグ形状の導体とを備え、前記コイル、あるいはジグザグ形状の導体の他端は前記導電体地板に接地されていることを特徴とするディジタルテレビジョン放送受信装置。

【請求項９０】　前記コイル、あるいはジグザグ形状の導体と前記アンテナ素子の他の部分とを、前記導電体地板上に設けた絶縁体上で接続することを特徴とする請求項８９に記載のディジタルテレビジョン放送受信装置。

【請求項９１】　前記コイル、あるいはジグザグ形状の導体が２つに分割されたものであって、前記分割された２つの部分の接続を、前記導電体地板上に設けた絶縁体上で行い、更にその接続部に給電部も接続することを特徴とする請求項８７又は９１に記載のディジタルテレビジョン放送受信装置。

【請求項９２】　全体がコイル、あるいはジグザグ形状の導体で形成され、少なくとも１箇所以上の屈曲部もしくは湾曲部を持つ形状に形成されたアンテナ素子を備えたことを特徴とするディジタルテレビジョン放送受信装置。

【請求項９３】　導電体地板と、その導電体地板に一端が接地され、近接配置されたアンテナ素子とを備え、給電部を前記導電体地板上に設けた絶縁体上を中継点として接続することを特徴とするディジタルテレビジョン放送受信装置。

【請求項９４】　導電体地板と、その導電体地板に一端が接地され、近接配置されたアンテナ素子とを備え、前記導電体地板に貫通孔を形成し、その貫通孔の前記アンテナ素子とは反対側の前記導電体地板上に絶縁体を設け、前記貫通孔を通して前記絶縁体上で給電部を接続することを特徴とするディジタルテレビジョン放送受信装置。

【請求項９５】　前記導電体地板の前記絶縁体を設けた側に、別の絶縁体を１つ以上設け、その別の絶縁体及び前記絶縁体間の上で、回路部品を接続することを特徴とする請求項９４に記載のディジタルテレビジョン放送受信装置。

【請求項９６】　導電体地板と、その導電体地板に近接配置されたアンテナ素子と、そのアンテナ素子と前記導電体地板との間に設けられ、所定部分に貫通孔を有する導体ケースとを備え、前記アンテナ素子の一端は前記導体ケースに接地し、前記導体ケース内の前記導電体地板上に設けた複数の絶縁体上の１つに前記貫通孔を通して給電部を接続し、前記複数の絶縁体間の上で回路部品を接続することを特徴とするディジタルテレビジョン放送受信装置。

【請求項９７】　導電体地板と、その導電体地板に近接配置された絶縁体板と、前記導電体地板から遠い側の前記絶縁体板上に形成されたアンテナ素子と、そのアンテナ素子から前記絶縁体板を貫通する導体と、その導体に接続され、前記絶縁体板の前記アンテナ素子が形成された面とは反対面に形成された導電体とを備え、前記アンテナ素子の一端は前記導電体地板に接地され、前記導電体の、前記接地された前記一端の近傍に、給電部が接続されていることを特徴とするディジタルテレビジョン放送受信装置。

【請求項９８】　導電体地板と、その導電体地板上に設けられた絶縁体板と、その絶縁体板上に設けられ、前記導電体地板より面積の小さい導体板と、その導体板に近接配置され、前記導体板に一端が接地されたアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から

得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項９９】　導電体地板と、その導電体地板上に設けられた絶縁体板と、その絶縁体板上に設けられ、前記導電体地板より面積の小さい導体板と、その導体板に近接配置され、前記導体板に一端が接地されたアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項１００】　前記導体板の面積と前記アンテナ素子の面積は、実質上同じ大きさであることを特徴とする請求項９８又は９９に記載のディジタルテレビジョン放送受信装置。

【請求項１０１】　前記２本以上のアンテナ素子が単一給電部で単一化されていることを特徴とする請求項８８～９１のいずれかに記載のディジタルテレビジョン放送受信装置。

【請求項１０２】　前記２本以上のアンテナ素子は、目標とする周波数帯を分割した複数の分割帯域にそれぞれ対応するアンテナであって、前記それらのアンテナ素子群により所望帯域化が実現されていることを特徴とする請求項１０１記載のディジタルテレビジョン放送受信装置。

【請求項１０３】　所定箇所にアンテナ接地用導電板が設けられた導電体地板と、その導電体地板の近傍に配置され、一端が前記アンテナ接地用導電板に接続されたアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項１０４】　所定箇所にアンテナ接地用導電板が設けられた導電体地板と、その導電体地板の近傍に配置され、一端が前記アンテナ接地用導電板に接続されたアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置。

【請求項１０５】　前記導電体地板と前記アンテナ素子平面が実質上平行に配設されていることを特徴とする請求項１０３又は１０４記載のディジタルテレビジョン放送受信装置。

【請求項１０６】　前記導電体地板の面積と前記アンテナ素子平面の面積が実質上同じ大きさであることを特徴とする請求項１０３、１０４、又は１０５記載のディジタルテレビジョン放送受信装置。

【請求項１０７】　複数のアンテナ素子を有する場合であって、それぞれアンテナ素子は、異なる偏波面の電波に対して最大ゲインを有するように、設置されていることを特徴とする請求項１～１０６のいずれかに記載のデジタルテレビジョン放送受信装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、特に自動車などの車体に取り付けられる、例えばＡＭ放送、ＦＭ放送、ＴＶ放送、無線電話等のアンテナ装置を利用したディジタルテレビジョン放送受信装置に関するものである。

【０００２】

【従来技術】カー・マルチメディア時代の進展に伴い、近年自動車においても、ＡＭ・ＦＭラジオだけでなく、ＴＶ、無線電話、ナビゲーションシステムなどの各種無線機器が搭載されるようになってきており、今後も電波によって提供される情報・サービスはますます増大し、アンテナの重要性はますます高まるものと思われる。

【０００３】一般に自動車などにアンテナを設置する場合、導電体地板で構成される車体が、指向性利得等のアンテナの性能に影響を及ぼす。従来、自動車に用いられるアンテナとしては、車体に設置することを考慮して、例えばモノポール、ロッドアンテナ、Ｖダイポールアンテナ等が利用されている。これらのアンテナの多くは、車体に対して、長い棒状のアンテナエレメントを突出させて設けるものがほとんどである。

【０００４】一方、近年、従来の地上波アナログテレビジョン放送の問題点を改善するために、地上波デジタル

テレビジョン放送方式が提案された。地上波デジタルテレビジョン放送においては、ＯＦＤＭ方式と呼ばれる直交する多数のキャリアを用いた通信方法が導入されており、マルチパス障害に対する様々な対策が行われている。例えば、遅延波による符号間干渉を防止する目的で、伝送シンボル間に、ガードインターバルと呼ばれるガード期間が設けられている。

【０００５】

【発明が解決しようとする課題】しかしながら、上述したように、一般に自動車に用いられている長い棒状のアンテナエレメント等を車体に突出させて設けているアンテナは、外観上の美観を損ねているばかりか、風切り音発生の原因や、盗難の危険性、洗車の際の取り外しなど、様々な問題を抱えている。

【０００６】また一方、地上波デジタルジョン放送方式において、ビルによる反射波などの干渉による周波数選択制フェージングなどの受信障害が発生する。さらに、地上波デジタルテレビジョン放送では、周波数帯域を有効に利用するため、ＳＦＮと呼ばれる複数の送信所から同一番組を同一の周波数で送信する方式が提案されている。このＳＦＮ放送方式の結果、隣接局から送信された信号との間には必ず遅延時間が存在し、その結果信号が干渉を起こして受信障害も発生する。

【０００７】本発明は、従来のアンテナや、ディジタル放送の課題を考慮し、自動車などの車体近傍に、あるいは車体と一体化して平面上に設置でき、かつ狭い場所でも配置ができるように小型化が可能であるアンテナ装置を備え、且つデジタルデータの移動受信における受信障害の改善を図る　デジタルテレビジョン放送受信装置を提供するものである。

【０００８】

【課題を解決するための手段】本発明（請求項１対応）は、少なくとも１箇所以上の屈曲部もしくは湾曲部を持つ線状導電体が、給電部に対して１つ、又は２つ以上存在するアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【０００９】本発明（請求項２に対応）は、少なくとも１箇所以上の屈曲部もしくは湾曲部を持つ線状導電体が、給電部に対して１つ、又は２つ以上存在するアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００１０】本発明（請求項４に対応）は、スパイラル形状の線状導電体が、給電部に対して１つ、又は２つ以上存在するアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００１１】本発明（請求項５に対応）は、　スパイラル形状の線状導電体が、給電部に対して１つ、又は２つ以上存在するアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００１２】本発明（請求項９に対応）は、導電体地板近傍に配置され、アンテナのアース端子と前記導電体地板とが接続されていることを特徴とするディジタルテレビジョン放送受信装置である。

【００１３】本発明（請求項１０に対応）は、導電体地板近傍に配置され、アンテナのアース端子と前記導電体地板との間にスイッチング素子が設けられているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベ

ースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００１４】本発明（請求項１１に対応）は、導電体地板近傍に配置され、アンテナのアース端子と前記導電体地板との間にスイッチング素子が設けられているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００１５】本発明（請求項２１に対応）は、複数のアンテナ素子を単一給電部で単一化したアンテナ素子群で、アンテナが構成されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。ことを特徴とするディジタルテレビジョン放送受信装置である。

【００１６】本発明（請求項２２に対応）は、複数のアンテナ素子を単一給電部で単一化したアンテナ素子群で、アンテナが構成されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００１７】本発明（請求項４１に対応）は、アンテナ素子のオープン端子側の対向する部分の結合が設定されていることにより、同調周波数が制御されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００１８】本発明（請求項４２に対応）は、アンテナ素子のオープン端子側の対向する部分の結合が設定されていることにより、同調周波数が制御されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００１９】本発明（請求項４３に対応）は、アンテナ素子のオープン端子側と、中性点、あるいは中性点近傍の対向する部分との結合が設定されていることにより、同調周波数が制御されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。ことを特徴とするディジタルテレビジョン放送受信装置である。

【００２０】本発明（請求項４４に対応）は、アンテナ

素子のオープン端子側と、中性点、あるいは中性点近傍の対向する部分との結合が設定されていることにより、同調周波数が制御されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００２１】本発明（請求項４７に対応）は、コイルの両極にそれぞれ少なくとも１つ以上の線状導電体を接続し、コイルの中性点からアース端子を、また各線状導電体あるいはコイルの所定の位置からタップを形成し、そこから給電端子が取り出されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００２２】本発明（請求項４８に対応）は、コイルの両極にそれぞれ少なくとも１つ以上の線状導電体を接続し、コイルの中性点からアース端子を、また各線状導電体あるいはコイルの所定の位置からタップを形成し、そこから給電端子が取り出されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００２３】本発明（請求項４９に対応）は、　少なくとも１つ以上の線状導電体が、コイルを介して、給電部に対して１つ、又は２つ設けられているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅

延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００２４】本発明（請求項５０に対応）は、　少なくとも１つ以上の線状導電体が、コイルを介して、給電部に対して１つ、又は２つ設けられているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００２５】本発明（請求項５７に対応）は、所定箇所が接地された主のアンテナ素子と、その主のアンテナ素子に近接配置され、前記主のアンテナ素子より相対的に短く、両端が接地されていない１個以上のアンテナ素子と、前記主のアンテナ素子に近接配置され、前記主のアンテナ素子より相対的に長く、両端が接地されていない１個以上のアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００２６】本発明（請求項５８に対応）は、所定箇所が接地された主のアンテナ素子と、その主のアンテナ素子に近接配置され、前記主のアンテナ素子より相対的に短く、両端が接地されていない１個以上のアンテナ素子と、前記主のアンテナ素子に近接配置され、前記主のア

ンテナ素子より相対的に長く、両端が接地されていない１個以上のアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００２７】本発明（請求項６７に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板の少なくとも前記アンテナ素子に対向する領域が前記アンテナ素子よりも通信相手側に配置されていることを特徴とするディジタルテレビジョン放送受信装置である。

【００２８】本発明（請求項７０に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子と、前記導電体地板及び前記アンテナ素子をその配置状態のまま回動させる回動手段とを備えたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００２９】本発明（請求項７１に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子と、前記導電体地板及び前記アンテナ素子をその配置状態のまま回動させる回動手段とを備えたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００３０】本発明（請求項７２に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子と、前記導電体地板と前記アンテナ素子との間であって、前記アンテナ素子の周辺に設置された強誘電体とを備えたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００３１】本発明（請求項７３に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子と、前記導電体地板と前記アンテナ素子との間であって、前記アンテナ素子の周辺に設置された強誘電体とを備えたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００３２】本発明（請求項７５に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記アンテナ素子が、前記導電体地板の形状に合わせた形状に形成されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００３３】本発明（請求項７６に対応）は、導電体地

板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記アンテナ素子が、前記導電体地板の形状に合わせた形状に形成されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００３４】本発明（請求項７８に対応）は、導電体地板と、その導電体地板にアース部が接続され、複数バンドの同調周波数に対応して近接配置された長さの異なる複数のアンテナ素子と、その複数のアンテナ素子のそれぞれに設けられた複数の給電部とをアンテナ装置である電磁波を電気信号に変換する入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００３５】本発明（請求項７９に対応）は、導電体地板と、その導電体地板にアース部が接続され、複数バンドの同調周波数に対応して近接配置された長さの異なる複数のアンテナ素子と、その複数のアンテナ素子のそれぞれに設けられた複数の給電部とを有するアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００３６】本発明（請求項８０に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板は、車の実質上垂直壁を形成する部分であり、そのアンテナ素子の電界は実質上水平に形成されるアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００３７】本発明（請求項８１に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板は、車の実質上垂直壁を形成する部分であり、そのアンテナ素子の電界は実質上水平に形成されるアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００３８】本発明（請求項８２に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板は、車の実質上水平壁を形成する部分であり、そのアンテナ素子の電界は実質上垂直に形成されたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００３９】本発明（請求項８３に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置

されたアンテナ素子とを備え、前記導電体地板は、車の実質上水平壁を形成する部分であり、そのアンテナ素子の電界は実質上垂直に形成されたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００４０】本発明（請求項８４に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板は、移動体装置のハウジング壁の一部であり、そのアンテナ素子は前記ハウジング壁の内部側に配置されているアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００４１】本発明（請求項８５に対応）は、導電体地板と、その導電体地板にアース部が接続され、近接配置されたアンテナ素子とを備え、前記導電体地板は、移動体装置のハウジング壁の一部であり、そのアンテナ素子は前記ハウジング壁の内部側に配置されているアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００４２】本発明（請求項８６に対応）は、導電体地板と、その導電体地板に近接配置されたアンテナ素子とを備え、前記アンテナ素子の所定部分はコイル、あるいはジグザグ形状の導体で形成されており、前記アンテナ素子の一端が前記導電体地板に接地されていることを特徴とするディジタルテレビジョン放送受信装置である。

【００４３】本発明（請求項８８に対応）は、導電体地板と、その導電体地板に近接して配置された長さの異なる２本以上のアンテナ素子とを備え、前記アンテナ素子のそれぞれの所定部分はコイル、あるいはジグザグ形状の導体で形成されており、前記アンテナ素子の各一端が共通して前記導電体地板に接地されていることを特徴とするディジタルテレビジョン放送受信装置である。

【００４４】本発明（請求項８９に対応）は、導電体地板と、その導電体地板に近接して配置された長さの異なる２本以上のアンテナ素子と、それらアンテナ素子の各一端の共通接続点に接続されたコイル、あるいはジグザグ形状の導体とを備え、前記コイル、あるいはジグザグ形状の導体の他端は前記導電体地板に接地されていることを特徴とするディジタルテレビジョン放送受信装置である。

【００４５】本発明（請求項９２に対応）は、全体がコイル、あるいはジグザグ形状の導体で形成され、少なくとも１箇所以上の屈曲部もしくは湾曲部を持つ形状に形成されたアンテナ素子を備えたことを特徴とするディジタルテレビジョン放送受信装置である。

【００４６】本発明（請求項９３に対応）は、導電体地板と、その導電体地板に一端が接地され、近接配置されたアンテナ素子とを備え、給電部を前記導電体地板上に設けた絶縁体上を中継点として接続することを特徴とするディジタルテレビジョン放送受信装置である。

【００４７】本発明（請求項９４に対応）は、導電体地板と、その導電体地板に一端が接地され、近接配置されたアンテナ素子とを備え、前記導電体地板に貫通孔を形成し、その貫通孔の前記アンテナ素子とは反対側の前記導電体地板上に絶縁体を設け、前記貫通孔を通して前記絶縁体上で給電部を接続することを特徴とするディジタルテレビジョン放送受信装置である。

【００４８】本発明（請求項９６に対応）は、導電体地板と、その導電体地板に近接配置されたアンテナ素子と、そのアンテナ素子と前記導電体地板との間に設けられ、所定部分に貫通孔を有する導体ケースとを備え、前記アンテナ素子の一端は前記導体ケースに接地し、前記導体ケース内の前記導電体地板上に設けた複数の絶縁体上の１つに前記貫通孔を通して給電部を接続し、前記複数の絶縁体間の上で回路部品を接続することを特徴とするディジタルテレビジョン放送受信装置である。

【００４９】本発明（請求項９７に対応）は、導電体地板と、その導電体地板に近接配置された絶縁体板と、前記導電体地板から遠い側の前記絶縁体板上に形成されたアンテナ素子と、そのアンテナ素子から前記絶縁体板を貫通する導体と、その導体に接続され、前記絶縁体板の前記アンテナ素子が形成された面とは反対面に形成された導電体とを備え、前記アンテナ素子の一端は前記導電

体地板に接地され、前記導電体の、前記接地された前記一端の近傍に、給電部が接続されていることを特徴とするディジタルテレビジョン放送受信装置である。

【００５０】本発明（請求項９８に対応）は、導電体地板と、その導電体地板上に設けられた絶縁体板と、その絶縁体板上に設けられ、前記導電体地板より面積の小さい導体板と、その導体板に近接配置され、前記導体板に一端が接地されたアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００５１】本発明（請求項９９に対応）は、導電体地板と、その導電体地板上に設けられた絶縁体板と、その絶縁体板上に設けられ、前記導電体地板より面積の小さい導体板と、その導体板に近接配置され、前記導体板に一端が接地されたアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００５２】本発明（請求項１０３に対応）は、所定箇所にアンテナ接地用導電板が設けられた導電体地板と、その導電体地板の近傍に配置され、一端が前記アンテナ接地用導電板に接続されたアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段からの信号を入力して遅延させる遅延手段と、前記遅延手段から得られた信号と、前記入力手段から得られた信号とを合成する合成手段と、前記合成手段から得られた信号に関してベースバンドの信号に変換する復調手段と、前記復調手段から得られた復調状況を示す信号を入力とし前記入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段から得られる信号に応じて前記合成手段および前記遅延手段を制御する合成制御手段とを具備し、前記合成制御手段の信号に応じて前記合成手段での信号の合成率と前記遅延手段での遅延時間設定の少なくとも一方を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００５３】本発明（請求項１０４に対応）は、所定箇所にアンテナ接地用導電板が設けられた導電体地板と、その導電体地板の近傍に配置され、一端が前記アンテナ接地用導電板に接続されたアンテナ素子とを備えたアンテナ装置である入力手段と、前記入力手段から得られる信号の周波数変換を行う受信手段と、前記受信手段からの信号をベースバンドの信号に変換する復調手段と、前記復調手段で得られた復調状況の情報を入力として入力手段で得られる信号に含まれる遅延波を推定する遅延波推定手段と、前記遅延波推定手段からの遅延波情報に基づいて前記復調手段を制御する復調制御手段とを具備し、前記復調制御手段で得られる制御信号に基づいて前記復調手段で扱う伝達関数を制御することを特徴とするデジタルテレビジョン放送受信装置である。

【００５４】

【発明の実施の形態】本発明にかかるディジタルテレビジョン放送受信装置に用いられるアンテナ装置の実施の形態を図面に基づいて説明する。

（１）先ず前半で、本発明にかかるディジタルテレビジョン放送受信装置に用いられるアンテナ装置の実施の形態を図面に基づいて説明する。

【００５５】本実施の形態におけるアンテナの原理について説明する。従来技術の項で説明したように、従来のアンテナは、導電体地板に近接して設置される場合、モノポールアンテナのように、導電体地板となる車体が指向性利得等のアンテナ性能に影響を及ぼす。本発明は、この導電体地板のアンテナへの影響を逆に利用することにより、指向性が無指向性となり、指向性利得が向上し、高選択性が得られるアンテナを実現するものである。

（実施の形態１）図１は、本発明にかかる第１の実施の形態におけるアンテナ装置を示す略示構成図である。すなわち、図１（ａ）は、アンテナ素子１０１を２箇所の屈曲部を持つ線状導電体で構成し、そのアンテナ素子１０１の所定位置に給電端子１０２を設け、一端部１０３をアースしたアンテナ装置である。また図１（ｂ）は、アンテナ素子１０４を４箇所の屈曲部を持つ線状導電体で構成し、そのアンテナ素子１０４の所定位置に給電端子１０２を設け、一端部１０３をアースしたアンテナ装置である。このように、本実施の形態のアンテナ装置は、モノポールアンテナのアンテナ素子を屈曲させているので設置面積を小さくできる。

【００５６】図２は、上記と同様の構成を持つアンテナ装置を導電体地板に近接配置した例を示す略示構成図である。すなわち、図２（ａ）は、アンテナ素子２０１を２箇所の屈曲部を持つ線状導電体で構成し、そのアンテナ素子２０１を導電体地板２０５とアンテナ平面が平行

になるように近接配置し、アンテナ素子２０１の所定位置に給電端子２０２を設け、一端部２０３を導電体地板２０５にアースしたアンテナ装置である。また図２（ｂ）は、アンテナ素子２０４を４箇所の屈曲部を持つ線状導電体で構成し、そのアンテナ素子２０４を導電体地板２０５とアンテナ平面が平行になるように近接配置し、アンテナ素子２０４の所定位置に給電端子２０２設け、一端部２０３を導電体地板２０５にアースしたアンテナ装置である。このように、本実施の形態のアンテナ装置は、設置面積を小さくできるとともに、前述した第１の実施の形態のアンテナ装置をアンテナ平面が導電体地板２０５に平行になるように近接配置しているので指向性利得性能が向上する。尚、アンテナ素子の屈曲部の数は上記の例に示した個数に限定されるものではない。このことは、以降の実施の形態においても同様である。

【００５７】図２（ａ）のアンテナの具体例を図８５に示す。図８５において、２箇所で折曲げられた線状導体のアンテナ素子８５０１は、導電体地板８５０４に所定の間隔をおいてアンテナ平面がほぼ平行に配置され、アンテナ素子８５０１の一端部が、導電体地板８５０４にほぼ垂直に設けられたアンテナ接地用の導電板８５０３の端部に接続されている。ここでは、アンテナ素子８５０１が形成する平面の面積と導電体地板８５０４の面積は、ほぼ同等とする。また、アンテナ素子８５０１の途中には給電部８５０２が設けられている。

【００５８】導電板８５０３はアンテナ素子８５０１の幅に対して十分広い幅、すなわち、アンテナ素子８５０１の同調周波数により決定されるリアクタンスの影響が実用上ないような幅を持つ。このためアースとして作用する。幅が小さいとアンテナ素子８５０１と結合して全体がアンテナ素子となり、本発明のものと異なる。アンテナ素子８５０１は、例えば、波長を９４０ｍｍとした場合、素子の全長が２２０ｍｍ、幅が２ｍｍとなり、コンパクト化が可能となる。ここで、アンテナ平面と導電体地板の面とは、アンテナ素子と地板との間に有効な電位差が生じる範囲であれば、傾斜していてもよい。また、導電体地板の面積がアンテナ平面の面積より大きい（例えば４倍）場合は、垂直偏波に対してはゲインは同じであり、水平偏波に対してはゲインが低下する。

【００５９】本実施の形態のアンテナと従来のアンテナとの違いを述べると、例えば、従来の逆Ｆアンテナは、アンテナ素子を接地板に近づけると性能が低下するが、本発明のアンテナ装置は逆に性能が向上する。

【００６０】図８５のアンテナのインピーダンス特性及びＶＳＷＲ特性を図８６に示す。また、指向性ゲイン特性を図８７に示す。図８７に示すように、図８５のアンテナは垂直偏波に対してほぼ円形な指向性を示す。

【００６１】なお、アンテナ素子の形状及び素子数は、この例に限定されないことは言うまでもない。

【００６２】また、導電体地板とアンテナ素子との間隔は、波長の１／４０以上であればより望ましい。

（実施の形態２）図３は、本発明にかかる第２の実施の形態のアンテナ装置を示す略示構成図である。すなわち、図３（ａ）は、アンテナ素子３０１を４箇所の屈曲部を持つ線状導電体でダイポールアンテナを構成し、そのアンテナ素子３０１の所定位置に給電端子３０２を設け、一端部３０３をアースしたアンテナ装置である。また図３（ｂ）は、アンテナ素子３０４を８箇所の屈曲部を持つ線状導電体でダイポールアンテナを構成し、そのアンテナ素子３０４の所定位置に給電端子３０２を設け、一端部３０３をアースしたアンテナ装置である。このように、本実施の形態のアンテナ装置は、ダイポールアンテナのアンテナ素子を巻き込むように屈曲させているので設置面積を小さくできる。

【００６３】図４は、上記と同様の構成を持つアンテナ装置を導電体地板に近接配置した例を示す略示構成図である。すなわち、図４（ａ）は、アンテナ素子４０１を４箇所の屈曲部を持つ線状導電体でダイポールアンテナを構成し、そのアンテナ素子４０１を導電体地板４０５とアンテナ平面が平行になるように近接配置し、アンテナ素子４０１の所定位置に給電端子４０２を設け、一端部４０３を導電体地板４０５にアースしたアンテナ装置である。また図４（ｂ）は、アンテナ素子４０４を８箇所の屈曲部を持つ線状導電体でダイポールアンテナを構成し、そのアンテナ素子４０４を導電体地板４０５とアンテナ平面が平行になるように近接配置し、アンテナ素子４０１の所定位置に給電端子４０２設け、一端部４０３を導電体地板４０５にアースしたアンテナ装置である。このように、本実施の形態のアンテナ装置は、設置面積を小さくできるとともに、アンテナ装置をアンテナ平面が導電体地板４０５に平行になるように近接配置した場合は、更に指向性利得性能が向上する。

（実施の形態３）図５は、本発明にかかる第３の実施の形態のアンテナ装置を示す略示構成図である。すなわち、図５（ａ）は、２箇所の屈曲部を持ち、素子長が異なる３つのモノポールのアンテナ素子５０１ａ，５０１ｂ，５０１ｃを同一平面上に配置し、アンテナ素子５０１ａ，５０１ｂ，５０１ｃのタップと給電端子５０３との間及び、給電端子５０３と接地端子５０５との間に、それぞれインピーダンスを調整するためにリアクタンス素子５０２ａ，５０２ｂ，５０２ｃ，５０４を接続した構成のアンテナ装置である。また図５（ｂ）は、上記の図５（ａ）のアンテナ装置のアンテナ素子５０１ａ，５０１ｂ，５０１ｃを４箇所の屈曲部を持つアンテナ素子５０６ａ，５０６ｂ，５０６ｃに変更したものである。

【００６４】上記の構成において、各アンテナ素子の同調周波数を所定の間隔をおいて設定することにより、所望の周波数帯域を有するアンテナ装置を実現できる。図４０は、アンテナ素子が７つのアンテナの場合の合成帯域を示す図であり、１つのアンテナ素子の帯域幅は狭い

が、合成することにより広帯域な周波数特性を持たせることが可能となる。

【００６５】この帯域合成の具体的な例を図８８から図９３のＶＳＷＲ特性により示す。すなわち、同調周波数の異なる４つのアンテナ素子を用いた例であり、同調周波数がそれぞれ、１９６．５ＭＨｚ（図８８）、１９８．７５ＭＨｚ（図８９）、２００．５ＭＨｚ（図９０）、２０３．７５ＭＨｚ（図９１）である。図９２は、これらアンテナ素子を帯域合成したときのＶＳＷＲ特性図であり、広帯域化されているのが分かる。また、図９３は、この時の縦軸における範囲を広く取ったとき（５倍）の図である。

【００６６】図６は、上記図５と同様の構成を持つアンテナ装置を導電体地板に接近配置した例を示す略示構成図である。このアンテナ装置は、導電体地板６０７に上記図５と同じ構成のアンテナ装置をアンテナ平面が平行になるように近接配置した構成である。すなわち、図６（ａ）は、２箇所の屈曲部を持ち、素子長が異なる３つのモノポールのアンテナ素子６０１ａ，６０１ｂ，６０１ｃを同一平面上に導電体地板６０７に近接して配置し、アンテナ素子６０１ａ，６０１ｂ，６０１ｃのタップと給電端子６０３との間及び、給電端子６０３と接地端子６０５との間に、それぞれインピーダンスを調整するためにリアクタンス素子６０２ａ，６０２ｂ，６０２ｃ，６０４を接続した構成のアンテナ装置である。また図６（ｂ）は、上記の図６（ａ）のアンテナ装置のアンテナ素子６０１ａ，６０１ｂ，６０１ｃを４箇所の屈曲部を持つアンテナ素子６０６ａ，６０６ｂ，６０６ｃに変更したものである。

【００６７】図７は、本実施の形態のアンテナ装置のまた別の例を示す略示構成図である。すなわち、図７（ａ）は、前述の図５（ａ）と同じ構成のアンテナ装置において、各アンテナ素子７０１ａ，７０１ｂ，７０１ｃ間に帯域合成用のリアクタンス素子７０８ａ，７０８ｂを設けた構成である。また図７（ｂ）は、前述の図５（ｂ）と同じ構成のアンテナ装置において、各アンテナ素子７０６ａ，７０６ｂ，７０６ｃ間に帯域合成用のリアクタンス素子７０８ａ，７０８ｂを設けた構成である。図５（ａ）及び（ｂ）の構成では、各リアクタンス素子５０２ａ，５０２ｂ，５０２ｃは、帯域合成の機能も兼用していたが、本実施の形態では、帯域合成の機能を分離させた構成としたため、インピーダンス調整及び帯域合成の調節が実施しやすくなる。

【００６８】図８は、本実施の形態のアンテナ装置の更に別の例を示す略示構成図である。このアンテナ装置は、導電体地板８０７に上記図７と同様の構成を持つアンテナ装置をアンテナ平面が平行になるように近接配置した構成である。すなわち、図８（ａ）は、前述の図６（ａ）と同じ構成のアンテナ装置において、各アンテナ素子８０１ａ，８０１ｂ，８０１ｃ間に帯域合成用のリアクタンス素子８０８ａ，８０８ｂを設けた構成である。また図８（ｂ）は、前述の図６（ｂ）と同じ構成のアンテナ装置において、各アンテナ素子８０６ａ，８０６ｂ，８０６ｃ間に帯域合成用のリアクタンス素子８０８ａ，８０８ｂを設けた構成である。

（実施の形態４）図９は、本発明にかかる第４の実施の形態のアンテナ装置を示す略示構成図である。すなわち、図９（ａ）は、４箇所の屈曲部を持ち、素子長が異なる３つのダイポールのアンテナ素子９０１ａ，９０１ｂ，９０１ｃを同一平面上に配置し、アンテナ素子９０１ａ，９０１ｂ，９０１ｃのタップと給電端子９０３との間及び、給電端子９０３と接地端子９０５との間に、それぞれインピーダンスを調整するためにリアクタンス素子９０２ａ，９０２ｂ，９０２ｃ，９０４を接続した構成のアンテナ装置である。また図９（ｂ）は、上記の図９（ａ）のアンテナ装置のアンテナ素子９０１ａ，９０１ｂ，９０１ｃを８箇所の屈曲部を持つアンテナ素子９０６ａ，９０６ｂ，９０６ｃに変更したものである。

【００６９】上記の構成において、各アンテナ素子の同調周波数を所定の間隔をおいて設定することにより、所望の周波数帯域を有するアンテナ装置を実現できる。

【００７０】図１０は、本実施の形態のアンテナ装置の別の例を示す略示構成図である。このアンテナ装置は、導電体地板１００７に上記図９と同様の構成を持つアンテナ装置をアンテナ平面が平行になるように近接配置した構成である。すなわち、図１０（ａ）は、４箇所の屈曲部を持ち、素子長が異なる３つのダイポールのアンテナ素子１００１，１００２，１００３を同一平面上に導電体地板１００７に近接配置し、アンテナ素子１００１，１００２，１００３のタップと給電端子１００８との間及び、給電端子１００８と接地端子１０１０との間に、それぞれインピーダンスを調整するためにリアクタンス素子１００４，１００５，１００６，１００９を接続した構成のアンテナ装置である。また図１０（ｂ）は、上記の図１０（ａ）のアンテナ装置のアンテナ素子１００１，１００２，１００３を８箇所の屈曲部を持つアンテナ素子１０１１，１０１２，１０１３に変更したものである。

【００７１】図１１は、本実施の形態のアンテナ装置のまた別の例を示す略示構成図である。すなわち、図１１（ａ）は、前述の図９（ａ）と同じ構成を持つアンテナ装置において、各アンテナ素子１１０１，１１０２，１１０３間に帯域合成用のリアクタンス素子１１１４，１１１５，１１１６，１１１７を２箇所に分けて設けた構成である。また図１１（ｂ）は、前述の図９（ｂ）と同じ構成を持つアンテナ装置において、各アンテナ素子１１１１，１１１２，１１１３間に帯域合成用のリアクタンス素子１１１４，１１１５，１１１６，１１１７を２箇所に分けて設けた構成である。図９（ａ）及び（ｂ）の構成では、各リアクタンス素子９０２ａ，９０２ｂ，

９０２ｃは、帯域合成の機能も兼用していたが、本実施の形態では、帯域合成の機能を分離させた構成としたため、インピーダンス調整及び帯域合成の調節が実施しやすくなる。

【００７２】図１２は、本実施の形態のアンテナ装置の更に別の例を示す略示構成図である。このアンテナ装置は、導電体地板１２０７に上記図１１と同様の構成を持つアンテナ装置をアンテナ平面が平行になるように近接配置した構成である。すなわち、図１２（ａ）は、前述の図１０（ａ）と同じ構成を持つアンテナ装置において、各アンテナ素子１２０１，１２０２，１２０３間に帯域合成用のリアクタンス素子１２１４，１２１５，１２１６，１２１７を２箇所に分けて設けた構成である。また図１２（ｂ）は、前述の図１０（ｂ）と同じ構成を持つアンテナ装置において、各アンテナ素子１２１１，１２１２，１２１３間に帯域合成用のリアクタンス素子１２１４，１２１５，１２１６，１２１７を２箇所に分けて設けた構成である。

（実施の形態５）図１３は、本発明にかかる第５の実施の形態のアンテナ装置を示す略示構成図である。すなわち、図１３（ａ）は、素子長が異なる３つのダイポールアンテナの各アンテナ素子１３０１，１３０２，１３０３をプリント基板１３０４上に形成したアンテナ装置である。また図１３（ｂ）は、上記の図１３（ａ）と同じ構成のアンテナ装置において、プリント基板１３０４上に、アンテナ素子１３２０とは反対側の面に導電体地板１３０８を形成したアンテナ装置である。このように、プリント基板を用いて、アンテナ素子１３０１，１３０２，１３０３（１３０５，１３０６，１３０７）及び導電体地板１３０８を形成する構成とすれば、アンテナの省スペース化が可能となると共に、作製が簡単であり、また性能の信頼性及び安定性も向上する。

【００７３】図１４は、本実施の形態のアンテナ装置の別の例を示す略示構成図である。このアンテナ装置は、前述の図１３（ａ）と同じ構成のものに、プリント基板のアンテナ素子とは反対側の面に帯域合成のための導電体を、アンテナ素子と交差するように形成した構成である。すなわち、図１４（ａ）は、素子長が異なる３つのダイポールアンテナの各アンテナ素子１４０１，１４０２，１４０３をプリント基板１４０４上に形成し、プリント基板１４０４のアンテナ素子１４１０を設けた面とは反対側の面に、２つの導電体１４０５をアンテナ素子と交差する方向に形成した構成のアンテナ装置である。また図１４（ｂ）は、上記の図１４（ａ）と同じ構成のアンテナ装置において、アンテナ素子１４１０とは反対側に導電体地板１４０６を近接配置したアンテナ装置である。この導電体地板１４０６は、多層プリント基板を用いてプリント基板上に形成してもよい。以上の構成により、帯域合成用の素子の作製が容易になる。

（実施の形態６）図１５は、本発明にかかる第６の実施の形態のアンテナ装置を示す略示構成図である。本実施の形態は、アンテナ素子１５０１，１５０２，１５０３を導電体地板１５０４に設けた凹部１５０５内に収納した構成のアンテナ装置である。この構成により、自動車等の車体からの突出がなくなり、また、アンテナ素子１５１０の周辺端部と導電体地板１５０４との相互作用により指向性利得性能が向上できる。

【００７４】図１６は、本実施の形態のアンテナ装置の別の例を示す略示構成図である。図１６（ａ）のアンテナ装置は、アンテナ素子１６０１，１６０２，１６０３で構成されるアンテナ１６１０とアンテナ素子１６０６，１６０７，１６０８で構成されるアンテナ１６２０とを同一平面内に配置し、かつ導電体地板１６０４に設けた凹部１６０５内に収納した構成のアンテナ装置である。ここでは、アンテナ１６１０とアンテナ１６２０とを異なるサイズ、形状のアンテナで構成しているが、同一のサイズ、形状でもよい。尚、アンテナは各々の給電部が近接するように配置する。また、図１６（ｂ）は、同様のアンテナを平面状の導電体地板１６０９に近接配置した例を示す図である。

【００７５】図１７は、本実施の形態のアンテナ装置のまた別の例を示す略示構成図である。図１７（ａ）のアンテナ装置は、アンテナ素子１７０１，１７０２，１７０３で構成される上側のアンテナ１７１０と下側のアンテナ１７２０とを上下に配置し、かつ導電体地板１７０４に設けた凹部１７０５内に収納した構成のアンテナ装置である。ここでは、アンテナ１７１０とアンテナ１７２０とを同一のサイズ、形状で構成しているが異なっていてもよい。また、図１７（ｂ）は、同様のアンテナを平面状の導電体地板１７０６に近接配置した例を示す図である。このような各アンテナ素子のサイズが同一の場合は、同調周波数が全て同じである。従って、アンテナ装置全体としての帯域幅は単一の素子の場合と同様であるが、図４１に示すように、アンテナ素子が単一の場合と比べて各アンテナ素子の利得が累積されるため、アンテナ装置全体としてのゲインが高くなり、高利得で高選択性なアンテナが実現できる。

【００７６】図１８は、本実施の形態のアンテナ装置の更にまた別の例を示す略示構成図である。図１８（ａ）のアンテナ装置は、それぞれが屈曲部を有する複数個のダイポール型のアンテナ素子からなる３つのアンテナ１８０１，１８０２，１８０３を多層プリント基板１８０６を用いて形成し、それを導電体地板１８０４に設けた凹部１８０５内に収納した構成のアンテナ装置である。ここでは、３つのアンテナ１８０１，１８０２，１８０３を同一のサイズ、形状で構成しているが異なっていてもよい。また、アンテナを３つとしたが、４つ以上を層形成してもよい。図１８（ｂ）は、同様のアンテナを平面状の導電体地板１８０７に近接配置した例を示す図である。このように、多層プリント基板を用いて複数のア

ンテナを積層する構成とすれば、簡単に高利得、高選択性のあるアンテナが得られる。

（実施の形態７）図１９は、本発明にかかる第７の実施の形態のアンテナの２つの例を示す略示構成図である。本実施の形態のアンテナは、それぞれ４箇所の屈曲部を持つ線状導電体を、給電部に対して２つ有した構成になっている。すなわち、図１９（ａ）は上述の図３（ｂ）と同様のアンテナ装置であり、屈曲の曲がり方向が給電点１９０１からみて逆方向の、２つの線状導電体１９０２，１９０３を有するもの、また、図１９（ｂ）は屈曲の方向が給電点１９０１からみて同方向の、２つの線状導電体１９０４，１９０５を有するものを示している。この形状により、平面上で小型化が可能であり、加えて無指向性が実現できる。

【００７７】一方、図２０（ａ）は、給電部２００１から第１屈曲点Ｐまでの長さが、第１屈曲点Ｐから第２屈曲点Ｑまでの長さより相対的に長いアンテナ素子２００２を有するアンテナ装置を示している。また、図２０（ｂ）は、給電部２００１から第１屈曲点Ｐまでの長さが、第１屈曲点Ｐから第２屈曲点Ｑまでの長さより相対的に短いアンテナ素子２００２を有するアンテナ装置を示している。以上の形状により、細長い場所にも設置が可能となる。

【００７８】本実施の形態においては、線状導電体が給電部に対して２つのものを示したが、これに限らず、１つのものであってもかまわない。又屈曲部の数もこれらに限定されるものではない。

【００７９】本実施の形態においては、線状導電体が給電部に対して２つのものを示したが、これに限らず、１つのものであってもかまわない。又屈曲部の数もこれらに限定されるものではない。

【００８０】又、本実施の形態においては、線状導電体が屈曲しているもの示したが、湾曲しているものでもよく、また、スパイラル状になっているものでもかまわない。例えば図２１（ａ）に示すように、給電部２１０１からみて、湾曲方向が逆の湾曲部を持った２つの線状導電体２１０２，２１０３を有する構成、あるいは、給電部２１０１からみて、湾曲方向が同じ湾曲部を持った２つの線状導電体２１０４，２１０５を有した構成でもかまわない。また、図２１（ｂ）に示すように、給電部２１０１からみて、巻回方向が逆方向のスパイラル状の２つの線状導電体２１０６，２１０７を有した形状構成、あるいは、給電部２１０１からみて、巻回方向が同方向のスパイラル状の２つの線状導電体２１０８，２１０９を有した形状構成でもよい。

【００８１】又、本実施の形態のアンテナを作成する場合、金属部材の加工によりアンテナ素子を形成しても勿論よいが、基板上にプリント配線を用いて形成してもよい。プリント配線を用いることによりアンテナの作成が極めて簡単になり、コスト低減、小型化、信頼性向上などが期待できる。

【００８２】又、本実施の形態のアンテナは、以降の実施の形態についても同様に適用できる。

（実施の形態８）図２２は、本発明にかかる第８の実施の形態のアンテナ装置の一例を示す略示構成図である。本実施の形態のアンテナ装置は、導電体地板に近接に配置され、アンテナのアース端子と地板が接続された構成になっている。例えば、図２２（ａ）に示すように、アンテナ素子２２０１が地板２２０４に近接に配置され、そのアース端子２２０３が地板２２０４に接続されている。尚、このアンテナ装置は前述した図４（ｂ）の構成と類似するが、給電端子２２０２が導電体地板２２０４を貫通した位置に設けられている点が異なっている。以上の構成により、所望のインピーダンス特性および指向性を得ることが可能となる。

【００８３】又、図２２（ｂ）は、アンテナのアース端子と導電体地板との間にスイッチング素子を設けた構成となっている。同図に示すように、アンテナ素子２２０１のアース端子２２０３と導電体地板２２０４間にスイッチング素子２２０５を設け、接続する場合としない場合とで、最適な電波伝搬が得られる状態を選択する構成とすることができる。この場合に、スイッチング素子２２０５を遠隔操作できるように構成して、電波の受信状態に応じて制御してもよい。ここで、アース端子２２０３が接続された場合は、垂直偏波用アンテナとなり、接続されない場合は、水平偏波用アンテナとなる。

【００８４】又、上記図２２（ｂ）では、給電端子２２０２が導電体地板２２０４を貫通している場合を示したが、これに限らず、例えば図２３に示すように、給電端子２３０２、アース端子２３０３が導電体地板２３０４を貫通していなくてもかまわない。

【００８５】図２４は、本実施の形態における導電体地板とアンテナの位置関係を示したもである。図２４（ａ）に示すように、導電体地板２４０２平面とアンテナ２４０１平面が、距離ｈをおいて平行になるように配置している。この場合、この距離ｈを制御することにより、アンテナ２４０１の指向性を所望の方向へ変化させることも可能である。また、アンテナ２４０１と導電体地板２４０２が近づいた場合は、同調周波数が高くなり、離れた場合は、同調周波数が低くなる。従って、伝搬の受信状態に応じて距離ｈを制御する構成とすればよい。この距離ｈの制御は、例えば、アンテナ２４０１を、図示しないが送り機構、スライド機構などを用いてアンテナ平面に対して垂直な方向に移動させる構成としてもよく、あるいは又、アンテナ２４０１と導電体地板２４０２との間に図示しない絶縁体のスペーサを挿入し、そのスペーサをアンテナ平面と平行な方向に移動させることにより、スペーサの挿入量を調節して行ってもよい。ここで、アンテナ作製時に所望のアンテナ性能を得るためにスペーサのサイズを決定するようにしてもよ

い。尚、地板とアンテナとの間のスペーサには、発泡スチロール等の低誘電率材料の使用が可能である。

【００８６】又、図２４（ｂ）に示すように、導電体地板２４０２平面とアンテナ２４０３平面間に所定の角度θ（この場合は９０°）を有するように立体配置してもよい。この所定の角度θをヒンジ機構等を利用して、調節することによって、アンテナ２４０３の指向性制御が可能である。

【００８７】更に、本実施の形態では、アンテナ素子の数が１つの場合を示したが、これに限らず２つ以上でもよい。又、単独の導電体により地板を構成したが、例えば、地板として自動車の車体等が利用できる。

（実施の形態９）図２５は、本発明にかかる第９の実施の形態のアンテナ装置の例を示す模式図である。所定の範囲に、複数のアンテナ素子を配置し、単一給電化したアンテナ素子群で１つのアンテナとする構成になっている。図２５（ａ）に示すように、複数のアンテナ素子２５０１，２５０２，２５０３を単一給電化し、アンテナ素子群で１つのアンテナを構成している。例えば、複数のアンテナ素子各々が、異なる周波数帯域をカバーすることにより、全体として所望の周波数帯域をカバーする広帯域なアンテナが実現できる。特に図２５（ａ）のような配置の場合、必然的に外側のアンテナ２５０１の素子長は内側のアンテナ２５０３の素子長より長くなるので、素子長の長いアンテナ２５０１を比較的低い同調周波数に、短いアンテナ２５０３を比較的高い同調周波数に設定することが容易であり、全体として広い帯域をカバーするアンテナが構成できる。

【００８８】又、２５（ｂ）に示すように、アンテナ素子がアンテナ平面を共有するが、互いに入り込まない配置でもよい。

【００８９】又、複数のアンテナ素子各々がカバーする帯域が同一である場合は、アンテナ効率を上げることも可能である。

【００９０】又、個々のアンテナ素子間のアイソレーションを得るため、それぞれのアンテナ素子間の距離を、所定のアイソレーションを得る間隔をもって配置してもよいし、個々のアンテナ素子にアイソレータあるいはリフレクタを接続してもよい。

【００９１】尚、本実施の形態においては、アンテナ素子の数は２つあるいは３つとしたが、アンテナ素子の数は２つ以上であればよく、これに限定されるものではない。

（実施の形態１０）図２６は、本発明にかかる第１０の実施の形態のアンテナ装置の例を示す模式図である。本実施の形態が上記第９の実施の形態と異なる点は、図２６（ａ）に示すように、アンテナ素子２６０１，２６０２，２６０３あるいは２６０４，２６０５，２６０６が基準平面に対して垂直な方向に層状となるように配置されていることである。尚、アンテナ素子に対する投影面における配置状態は、左図のように全部が重なっていてもよいし、右図のように一部が重なっていてもよいし、更には離れていてもよい。図２６（ｂ）は、本実施の形態の適用例を示し、多層プリント基板２６０９上にプリント配線を用いて形成したアンテナ２６１１，２６１２を示す一部切り欠き図であり、アンテナの水平面上での配置が一部重なっている状態を示す。両素子の所定位置での結合は、スルーホール２６１０に導電体を通すことで可能となる。

（実施の形態１１）図２７は、本発明にかかる第１１の実施の形態のアンテナ装置の例を示す模式図であり、図２７（ａ）は、複数のアンテナ素子群を単一給電化したアンテナの給電部の一例を示したものである。図２７（ａ）に示すように、各アンテナ素子２７０１，２７０２，２７０３の所定位置にタップ２７０４，２７０５，２７０６を形成し、これらを給電端子２７０７に接続する。ここでは、タップのとる方向は、全てのアンテナ素子で同一方向の場合を示したが、アンテナ素子ごとに任意に設定してもかまわない。

【００９２】図２７（ｂ）は、給電端子から各アンテナ素子のタップ位置までの電極を共通化したアンテナを示したものである。同図に示すように、各アンテナ素子２７０１，２７０２，２７０３の所定位置にタップ２７０４，２７０５，２７０６を形成し、タップ位置から給電端子２７０７までの電極２７０８が共通のものとなっている。これにより、構成が簡易になるばかりでなく、この電極２７０８を例えば最外郭アンテナ素子２７０１に平行に配置することで、より省スペース化が可能になる。

【００９３】又、図２８は、リアクタンス素子を介して、各アンテナ素子のタップをとったアンテナを示したものである。図２８（ａ）に示すように、各アンテナ素子２８０１，２８０２，２８０３別々にリアクタンス素子２８０４，２８０５，２８０６を介して給電端子２８０７に接続してもよいし、図２８（ｂ）に示すように、給電端子２８０７とタップ位置との間の共通電極２８０８中にリアクタンス素子２８０９を設けてもよい。この場合に、上述した図９のように、給電端子とアース端子との間にリアクタンス素子を設けてもよい。このように、適当なリアクタンス素子を用いることにより、所望のインピーダンス、帯域かつ最大効率を得ることが可能となる。尚、リアクタンス素子には、可変リアクタンス素子を用いて調整してもかまわない。

（実施の形態１２）図２９は、本発明にかかる第１２の実施の形態のアンテナ装置の例を示す模式図である。導電体地板近傍の所定の範囲に、複数のアンテナ素子を配置し、単一給電化したアンテナ素子群で１つのアンテナを構成し、その給電部のアース端子と導電体地板を接続した構成になっている。図２９に示すように、複数のアンテナ素子２９０１，２９０２，２９０３を、導電体地

板２９０９を貫通して配置された給電端子２９０７から単一給電化し、アンテナ素子群で１つのアンテナを構成し、その給電部のアース端子２９０８と導電体地板２９０９を接続している。以上の構成により、導電体地板近傍に、平面上に小型、高利得のアンテナを設置できる。

（実施の形態１３）図３０は、本発明にかかる第１３の実施の形態のアンテナ装置の例を示す模式図である。

【００９４】図３０（ａ）に示すように、アンテナ素子のオープン端子側の対向する部分３００１と３００２との間隔を所定の距離に設定し、両者の結合を制御することにより、同調周波数を制御する。

【００９５】又、アンテナ素子のオープン端子側の対向する部分３００１，３００２の結合の設定に関しては、図３０（ｂ）に示すように、誘電体３００３を設けてもいいし、図３０（ｃ）に示すように、両者をリアクタンス素子３００４を介して接続してもよい。このとき、誘電体３００３を移動可能な構成として結合を制御してもよいし、リアクタンス素子３００４を可変リアクタンスとして結合を制御する構成としてもよい。

【００９６】又、本実施の形態においては、アンテナ素子数が１つのものを示したが、上記図２５で示したアンテナのように、アンテナ素子数が２以上のものでもよく、これに限らない。

（実施の形態１４）図３１は、本発明にかかる第１４の実施の形態のアンテナ装置の例を示す模式図である。

【００９７】図３１（ａ）に示すように、アンテナ素子のオープン端子側３１０１，３１０２と、中性点３１０３あるいは中性点近傍の対向する部分３１１１，３１１２との間の距離を所定の距離に設定することで、同調周波数を制御する。

【００９８】又、アンテナ素子のオープン端子側と、中性点あるいは中性点近傍の対向する部分の結合の設定に関しては、図３１（ｂ）、（ｃ）に示すように、誘電体３１０４を設けてもいいし、両者をリアクタンス素子３１０５、あるいは３１０６を介して接続してもよい。このとき、上記第１３の実施の形態と同様、誘電体３１０４を移動可能な構成として結合を制御してもよいし、リアクタンス素子３１０１，３１０２を可変リアクタンスとして結合を制御する構成としてもよい。

【００９９】又、本実施の形態においても、アンテナ素子数が１つのものを示したが、上記図２５で示したアンテナのように、アンテナ素子数が２以上のものでもよく、これに限らない。

（実施の形態１５）図３２は、本発明にかかる第１５の実施の形態のアンテナ装置の例を示す模式図である。本実施の形態のアンテナ装置は、コイルの両極にそれぞれ少なくとも１つの線状導電体を接続し、コイルの中性点からアース端子を、各線状導電体あるいはコイルの所定の位置からタップを形成し、そこから給電端子を取り出す構成となっている。図３２（ａ）に示すように、コイル３２０３は両極にそれぞれ線状導体３２０１と３２０２とを有し、コイル３２０３の中性点からアース端子３２０６を、線状導電体（ここでは３２０２）の所定の位置からタップ３２０４を形成して給電端子３２０５を、取り出す構成としている。又、図３２（ｂ）に示すように、コイル３２０３の所定の位置からタップ３２０４を形成し、給電端子３２０５を取り出してもよい。

【０１００】以上の構成により、コイルの巻回数によってアンテナの同調周波数を調節することが可能であるうえ、小型化、広帯域が実現できる。

【０１０１】図３３は、コイルが複数の線状導電体を有する場合を示している。図３３（ａ）に示すように、コイル３３０７は両極にそれぞれ複数の線状導電体３３０１，３３０２３３０３と３３０４，３３０５，３３０６とを有し、コイル３３０７の中性点３３１０からアース端子３３１１を、各線状導電体（ここでは、３３０４，３３０５，３３０６）の所定の位置からタップ３３０８を形成して給電端子３３０９を、取り出す構成としている。又、図３３（ｂ）に示すように、コイル３３０７の所定の位置からタップ３３１２を形成し、給電端子３３０９を取り出してもよい。尚、ここでは片側の線状導電体の数が３つのものを示したが、２つ以上であればよくこれに限らない。

【０１０２】又、本実施の形態では、アンテナ素子となる線状導電体の形状は直線のもののみを示したが、少なくとも１つ以上の屈曲部あるいは湾曲部を持つか、スパイラル形状のものでもよく、これに限定されるものではない。

（実施の形態１６）図３４は、本発明にかかる第１６の実施の形態のアンテナ装置の例を示す模式図である。本実施の形態のアンテナ装置は、複数の線状導電体を共通化したものが、コイルを介して、給電部に対して１つ、又は２つ有する構成となっている。図３４に示すように、複数の線状導電体３４０１，３４０２，３４０３及び３４０４，３４０５，３４０６を共通化した電極３４０７及び３４０８と、給電部３４１１が、コイル３４０９，３４１０を介して接続された構成になっている。以上の構成により、コイルの巻回数によってアンテナの同調周波数を調節することが可能であるうえ、小型化、広帯域が実現できる。

（実施の形態１７）図３５は、本発明にかかる第１７の実施の形態のアンテナ装置の一例を示す略示構成図である。本実施の形態のアンテナ装置は、複数のアンテナ素子群で構成されるアンテナ複数個を、所定の範囲内に設置し、それらアンテナの中で受信状況が最適なものを選ぶダイバーシティ受信を行う構成としたものである。例えば、図３５において、２つのアンテナ３５０１，３５０２で、最適な電波伝搬が得られる方のアンテナを給電部に接続されたダイバー切換スイッチ３５０３により選択するものである。ここで、アンテナの個数は、本実施

の形態のように２つに限定されるものではなく３個以上であってもよい。又、アンテナの種類も図３５に示した形状のアンテナに限定されるものではなく、上記実施の形態で説明した他の種類のアンテナ、異なる種類のアンテナ同士等であってもよい。

【０１０３】また、複数のアンテナから最適なアンテナを選択する制御において、受信機入力最大のアンテナを選択する制御を行ってもよい。また、マルチパス妨害レベル最小のアンテナを選択する制御を行ってもよい。

【０１０４】又、上記実施の形態１～１７の各アンテナ素子給電部、あるいは複数のアンテナ素子群を単一給電化したアンテナの給電部に、平衡不平衡変換器、モード変換器、あるいはインピーダンス変換器を接続してもよい。

（実施の形態１８）図３６は、本発明にかかる第１８の実施の形態におけるアンテナの設置場所を説明する外観図である。本実施の形態では、アンテナを自動車に取り付ける場合の設置場所について説明している。設置するアンテナは、上記各実施の形態で説明したアンテナ装置である。アンテナの設置場所は、図３６に示すように、リアスポイラー３６０１、トランクリッド・リアパネル３６０２，リアトレイ３６０３、ルーフスポイラー３６０４、ルーフボックス３６０６、サンルーフバイザーなどのルーフ３６０５である。

【０１０５】又、アンテナを垂直に設置したい場合は、例えば図３７（ａ）示すように、自動車のスポイラー３７０１，３７０２の両端部３７０３やサンバイザーの端部３７０３等に、あるいは図３７（ｂ）に示すように、ピラー部３７０４に設置すればよい。もちろん、これに限らず、自動車の他の部位でも水平面からある程度傾斜しているところであれば設置可能である。これらの位置に配置することにより、所望の偏波を受けやすくすることができる。

【０１０６】前述したように、本発明の各アンテナ装置は、アンテナ平面と導電体地板である車体平面とを平行に近接配置できるので、車体から突出させずに設置することができ、また、占有面積が小さいので、狭いスペースに設置できる。従って、外観上の美観が向上し、風切り音発生の抑制が可能となり、更に、盗難の危険性、洗車の際の取り外しなどの問題点が解消できる。

（実施の形態１９）図３８は、本発明にかかる第１９の実施の形態のアンテナ装置を備えた移動体通信装置の例を示す模式図である。図３８に示すように、自動車などの車体３８０５の天井部に、上述した実施の形態のいずれかのアンテナ３８０１を設置している。このとき、アンテナ３８０１を天井部に形成した凹部３８０６に収納すれば、車体３８０５のアウトラインからアンテナが突出することがない。アンテナ３８０１は、車体３８０５内部に搭載された増幅器３８０２及び変復調器３８０３等で構成された通信器３８０４に接続されている。

（実施の形態２０）図３９は、本発明にかかる第２０の実施の形態のアンテナ装置を備えた携帯電話の例を示す模式図である。図３９（ａ）は、例えば、携帯電話の樹脂製のケース３９０１内部に設けられた導電性のシールドケース３９０２を導電体地板として利用し、そのシールドケース３９０２に平行になるようにアンテナ３９０３をケース３９０１内部側面に配置した例である。また、図３９（ｂ）は、携帯電話の樹脂製のケース３９０１の外側上部にアンテナ３９０４を配置し、ケース３９０１を挟んでアンテナ３９０４と対向する内部に導電体地板３９０５を設けた例である。この場合、シールドケース３９０２の上部は、通常面積が小さいため、導電体地板として利用しない。図３９（ａ）及び（ｂ）とも、用いるアンテナは、上述した各実施の形態のアンテナの中でも、特に小型化が容易にできる屈曲部の数、あるいは巻回数が多いものを利用すればよい。

【０１０７】このような構成を用いれば、アンテナから見て導電体地板側の指向性利得は極めて小さいため、導電体地板側を人体側にして使用すれば、アンテナ効率を落とすことなく、人体への電磁波障害を軽減できる。

【０１０８】なお、上記第１８の実施の形態では、アンテナ装置を自動車に設置する例を説明したが、これに限らず、例えば飛行機、船舶など他の移動体でもよい。あるいは又、移動体に限らず、高速道路などの交通路の路面、路肩、料金ゲート、トンネル内、更には、建築物の壁面、窓などに設置してもよい。

【０１０９】また、上記第１９の実施の形態では、アンテナ装置を移動体通信装置を例に説明したが、これに限らず、例えば、テレビ、ラジカセ、無線機など電波を受信あるいは送信する装置であれば、利用可能である。

【０１１０】また、上記第２０の実施の形態では、携帯電話を例に説明したが、これに限らず、例えば、ＰＨＳ、ポケベル、ナビゲーションシステムなど他の携帯無線器でも適用可能である。

（実施の形態２１）図４２は、本発明にかかる第２１の実施の形態のアンテナ装置を示す略示構成図である。すなわち、図４２（ａ）は、モノポールタイプの広帯域アンテナであり、一端が接地４２０４に接続された主たるアンテナ素子４２０２と、その主のアンテナ素子４２０２に対して、近接配置され、アンテナ素子４２０２より素子長が長く、両端とも接地されていないアンテナ素子４２０１及びアンテナ素子４２０２より素子長が短く、両端とも接地されていないアンテナ素子４２０３とで構成されたアンテナ装置である。主のアンテナ素子４２０２には、タップが設けられ、インピーダンス調整用のリアクタンス素子４２０５を通じて給電点４２０６に接続されている。また図４２（ｂ）は、上記の図４２（ａ）のアンテナ装置のアンテナ素子４２０１，４２０２，４２０３をプリント基板４２０７上に、プリント配線を利用して形成したものである。

【０１１１】図４３は、上記実施の形態のアンテナ装置をダイポールタイプとしたものである。すなわち、図４３（ａ）は、ダイポールタイプの広帯域アンテナであり、中央部が接地４３０４に接続された主たるアンテナ素子４３０２と、その主のアンテナ素子４３０２に対して、近接配置され、アンテナ素子４３０２より素子長が長く、どこも接地されていないアンテナ素子４３０１及びアンテナ素子４３０２より素子長が短く、どこも接地されていないアンテナ素子４３０３とで構成されたアンテナ装置である。主のアンテナ素子４３０２には、タップが設けられ、インピーダンス調整用のリアクタンス素子４３０５を通じて給電点４３０６に接続されている。また図４３（ｂ）は、上記の図４３（ａ）のアンテナ装置のアンテナ素子４３０１，４３０２，４３０３をプリント基板４３０７上に、プリント配線を利用して形成したものである。

【０１１２】上記の構成により、簡単な構成で、広帯域化と高ゲイン化、調整容易化が計れる。

【０１１３】なお、上記実施の形態では、主のアンテナ素子に近接配置する主のアンテナ素子より短いアンテナ素子及び長いアンテナ素子は、それぞれ１個づつで構成したが、これに限らず、それぞれ２個以上を近接配置した構成でもよい。

（実施の形態２２）図４４は、本発明にかかる第２２の実施の形態のアンテナ装置を示す略示構成図である。すなわち、図４４（ａ）は、上記の図１０などで説明したアンテナ素子に導電体地板が近接配置されたアンテナ装置に類似するが、それらアンテナ装置と異なる点は、アンテナ素子４４０１，４４０２，４４０３に近接配置される導電体地板４４０４の大きさが、最も外側のアンテナ素子４４０１の大きさとほぼ同じか、あるいはそれよりも小さく設定されている点である。このような構成によれば、導電体地板がアンテナ素子よりも大きい場合と比較して、水平偏波ゲインの向上が計れる。

【０１１４】また、図４４（ｂ）は、上記図４４（ａ）のアンテナ装置を、例えば移動体ボディ、通信機ケース、家屋壁、その他の装置ケースなどに設けた凹部に収納する例を示し、アンテナアース（導電体地板）４４０４とそれらケースアースとを接続しない構成としたものである。この構成によって、水平及び垂直の両偏波ともに高いゲインを得ることができる。このアンテナの垂直偏波における指向性ゲイン特性を図９４に示す。アンテナアースとケースアースとの設置距離（すなわち、離隔距離）は、（ａ）が１０ｍｍ、（ｂ）が３０ｍｍ、（ｃ）が８０ｍｍ、（ｄ）が１５０ｍｍであり、設置距離が小さいほどゲインは高くなっている。すなわち、アンテナアースとケースアースとは接近するほど性能が向上する。また、この例では、外側ケースからアンテナが飛び出さないようにするために、アンテナアース４４０４を移動体ボディ、通信機ケース、家屋壁、その他の装置ケースなどに設けた凹部に収納しているが、ケースアースの平坦面に一定の設置距離をとって近接設置してもアンテナとしての効果は同様であり、その場合も本発明に含まれる。

【０１１５】また、本実施の形態では、アンテナ素子としてバランスタイプのものを用いた構成としたが、アンテナ素子にアンバランスタイプのものを用いた構成でも同様に効果がある。

（実施の形態２３）図４５は、本発明にかかる第２３の実施の形態のアンテナ装置を示す略示構成図である。本実施の形態は、アンテナ素子に導電体地板を近接配置する場合において、どの程度の距離に近接させるのが良いかを示す例であり、図４５（ａ）は、アンテナ素子が１個の場合の例である。すなわち、アンテナ素子４５０１（正確にはアンテナアース接続部）と導電体地板４５０２との距離ｈを、アンテナの共振周波数ｆにおける波長λに対して、０．０１～０．２５倍（すなわち、０．０１λ～０．２５λ）の範囲に設定する。この構成によって高ゲイン化、調整の容易化が計れる。

【０１１６】また、図４５（ｂ）は、アンテナ素子が４個の場合を示し、アンテナ素子４５０３，４５０４，４５０５，４５０６は、導電体地板４５０７からそれぞれ異なる距離に配置される。図４５（ｂ）に示すように、素子長がそれぞれ異なる場合は、素子長が短いほどそのアンテナ素子の共振周波数は高くなり、波長が短い。従って、素子長が最も短いアンテナ素子４５０６の距離ｈ１を最も小さく設定し、素子長の最も長いアンテナ素子４５０３の距離ｈ２を最も大きく設定し、中間のアンテナ素子４５０４，４５０５の距離は、各アンテナ素子の共振周波数における波長に応じてそれぞれ距離を設定すれば良い。その場合に、各アンテナ素子４５０３，４５０４，４５０５，４５０６と導電体地板４５０７との距離は、前述したように、各アンテナ素子の共振周波数におけるそれぞれの波長に対して、０．０１～０．２５倍（すなわち、０．０１λ～０．２５λ）の条件を満足するように設定する。

（実施の形態２４）図４６は、本発明にかかる第２４の実施の形態のアンテナ装置を示す略示構成図である。本実施の形態では、アンテナ素子４６０１と導電体地板４６０２との間に、高誘電率材を設ける。従って、上述したアンテナ装置のうちで、アンテナ素子に導電体地板を近接配置する実施の形態の構成のものに対して適用可能である。ここで、アンテナ素子と導電体地板との間に、高誘電率材を設けることにより、アンテナ素子及び導電体地板間の距離を等価的に小さくできる。

（実施の形態２５）図４７は、本発明にかかる第２５の実施の形態のアンテナ装置における車体への適用例を示す外観図である。すなわち、上述した本発明の実施の形態のいずれかのアンテナ装置を、自動車の前後左右の車体ピラー部４７０１の４箇所とルーフ部の１箇所の全部

で５箇所に設置することにより、これら平面アンテナでダイバーシティ構成とするものである。この構成によって水平垂直両偏波に対して良好な送受信が可能になる。ここでは、アンテナの設置箇所を５箇所としたが、設置箇所はこれに限定されるものではない。

（実施の形態２６）図４８は、本発明にかかる第２６の実施の形態におけるアンテナ装置の設置箇所の車体各部への適用例を示す外観図である。すなわち、上述した本発明の実施の形態のいずれかのアンテナ装置を、自動車の車体４８０１のルーフパネル、ボンネット、車体ピラー部、車体側面、バンパー、タイヤホィール、フロアーなど車体４８０１表面の設置可能な、いずれかの場所、あるいは複数の場所に取り付けるものである。図４８において、アンテナ４８０２は、アンテナ平面がほぼ水平となる場所に設置されものであり、アンテナ４８０３は、アンテナ平面が斜めに傾く場所に設置されたものであり、アンテナ４８０４は、アンテナ平面がほぼ垂直となる場所に設置されたものである。図は、アンテナの設置場所として適当な場所を示したものであり、全てを設置する必要はない。又、図に示した以外の他の場所に設置しても勿論よい。また、車の種類も図のような乗用車に限定されることはなく、バス、トラックなどの車でも可能である。

【０１１７】尚、アンテナ４８０５は、アンテナ平面が水平となるように設置されたものであるが、特にフロアーの裏側（下側）に設置されており、指向特性が路面方向に向いているため、通信、車体の存在場所の検出などのために利用される道路上に設置された（あるいは埋め込まれた）電波源との通信に適している。

【０１１８】通常、ＴＶやＦＭ放送の電波は水平偏波を主とする電波であり、携帯電話、無線通信機などの電波は垂直偏波を主とする電波であり、アンテナの設置方向によって、水平偏波に適しているか垂直偏波い適しているかが決まる。図４９（ａ）に示すように、車体４８０１の一部である垂直な面の導電体地板４９０１の面に平行に設置され、アース端が接続されたアンバランスタイプの３素子のアンテナ４９０２では、右図に示すように電界が水平になり、水平偏波に対して感度を高くできるので、水平偏波用のアンテナとして有効である。これは、図４８のアンテナ４８０４で示す場所に設置することにより実現できる。また、アンテナ４８０２は、車体４８０１の水平な面に平行に設置されたアンテナであるため、その電界は垂直になり、垂直偏波に対して高感度となるので垂直偏波用アンテナとして有効である。更に、アンテナ４８０３は、斜め方向に傾いて設置されたアンテナであり、その傾き度合に応じて水平偏波と垂直偏波とのバランスの取れた感度を有し、偏波方向にあまり左右されず使用できる。図４９（ｂ）は、バランスタイプのアンテナの例を示す図であり、この場合は前述と同様に、水平偏波用アンテナとして有効である。

（実施の形態２７）図５０は、本発明にかかる第２７の実施の形態におけるアンテナ装置の構成を示す模式図である。本実施の形態のアンテナ装置が前述までのアンテナ装置と異なる点は、電波の送受する方向がアンテナ素子側ではなく導電体地板側である点である。図５０（ａ）に示すように、導電体地板５００１に平行に３素子のアンテナ５００２を所定の間隔で配置し、そのアンテナ５００２のアース端部を導電体地板５００１に接続し、導電体地板５００１側が外側を向いた構成とするものである。このアンテナは、図５０（ｂ）において、アンテナ５００２面が覆う領域に対応する導電体地板５００１の領域の上側（アンテナ５００２とは反対側）と、アンテナ５００２に対して下側に対象な指向性特性を持っている。そのため、アンテナ５００２と導電体地板５００１との配置方向を、従来の配置と反対にしても、これまで説明した実施の形態のアンテナと同様の効果を得ることができ、更に、図５０（ｃ）に示すように、導電体地板５００３が閉塞されたケース形状であっても同様の特性があり、導電体地板５００３内部のアンテナ５００２に給電しても導電体地板５００３を通じて外部に対して通信が可能である。

【０１１９】図５１は、図５０がアンバランスタイプのアンテナ装置であるのに対し、これをバランスタイプのアンテナ装置とした例であり、前述と同様の効果がある。

【０１２０】また、図５２は、図４８と同様な車体の各場所に本実施の形態におけるアンテナ装置を適用した例を示す図である。図５２において、図４８と同様に、アンテナ５２０２は、アンテナ平面がほぼ水平となる場所に設置されものであり、アンテナ５２０３は、アンテナ平面が斜めに傾く場所に設置されたものであり、アンテナ５２０４は、アンテナ平面がほぼ垂直となる場所に設置されたものである。また、アンテナ５２０５は、アンテナ平面が水平となるように設置されたものであるが、特にフロアーの内側に設置されており、図４８の場合と同様に道路上に設置された電波源との通信に適している。これらのアンテナは、すべて車体５２０１の内側に配置されているが、上述した理由により車体表面に設置した場合と同様の性能を実現でき、アンテナが車体外部へ露出しないので、美観、損傷、盗難などの点から極めて有利である。更に、図５２に示すように、バックミラーや室内サンバイザー、あるいはナンバープレート等、通常は外部に取り付けることができない場所でも、その内部を利用して設置可能である。

【０１２１】図５３は、本実施の形態におけるアンテナ装置の携帯電話への適用例を示す外観図であり、導電体のアース外箱５３０１の内側にアンテナ５３０２を設置し、アンテナアースをアース外箱５３０１に接続した構成である。この構成により、アンテナをアース外箱５３０１の外側に設けた場合と同様に使用することができる

とともに、アンテナが外部に露出しないので取り扱い上有利である。ここでは、携帯電話を例に説明したが、ＴＶ、ＰＨＳ、その他の無線機器などにも適用可能である。

【０１２２】図５４は、本実施の形態におけるアンテナ装置の一般家屋への適用例を示す外観図である。すなわち、アンテナ５４０２は家屋５４０１の導電体のドアの内側に設置され、アンテナ５４０３は導電体の窓（例えば雨戸）の内側に設置され、アンテナ５４０４は導電体の壁の内側に設置され、アンテナ５４０５は導電体の屋根の内側に設置されている。このように、家屋５４０１の導電体である構造物の内側を利用してアンテナを設置すれば、アンテナが外部に露出しないので、風雨による損傷や劣化を防止でき、長寿命化につながる。

【０１２３】なお、家屋が導電体でない構造物の場合でも、アンテナを設置する場所のみ外側に導電体を取り付ければ簡単に設置可能である。

（実施の形態２８）図５５は、本発明にかかる第２８の実施の形態におけるアンテナ装置の構成を示す模式図である。本実施の形態は、導電体地板５５０１と、それに平行に近接して設置されたアンテナ５５０２とを同時に、一点鎖線で示す軸を中心として回動（または回転でもよい）できる構成としたものである。図５５（ａ）のように、アンテナ５５０２が垂直な状態では右図のように電界が水平となるため、水平偏波に対して高感度となり、また、同図（ｂ）のように、アンテナ５５０２が水平な状態では右図のように電界が垂直となるため、垂直偏波に対して高感度となり、偏波の状態に応じてアンテナを最適な向きに調節できる。もちろん、斜めに傾いた状態に設定してもよい。図５５（ａ）の設置状態における指向性ゲイン特性を図９５に示し、図５５（ｂ）の設置状態における指向性ゲイン特性を図９６に示す。これら両図から明らかなように、アンテナが垂直な状態では水平偏波に対して高感度になり、アンテナが水平な状態では垂直偏波に対して高感度になっているのが分かる。

【０１２４】ここで、導電体地板５５０１及びアンテナ５５０２を回動させる方法としては、手でハンドルを回す手動式としてもよいし、モータ等の駆動装置を用いて自動式としてもよい。

【０１２５】図５６（ａ）は、上記の効果をアンテナを回動させることなしに実現するためのアンテナ装置の構成を示す図である。すなわち、導電体地板５６０１とアンテナ５６０２との間に、アンテナ５６０２を挟むように強誘電体５６０３を配置した構成とする。この構成により、図５６（ｂ）の右図に示すように、導電体地板５６０４とアンテナ５６０５との間の電界が強誘電体５６０６を介して水平方向に広げられるため、左図の強誘電体が無い場合に比較して、垂直成分が小さくなり水平成分が大きくなる。このように、強誘電体の有無に応じてアンテナを垂直偏波用か水平偏波用かに設定できる。尚、アンテナが垂直な状態に設置されている場合は、上記とは逆になる。この強誘電体５６０３は、製作時に取り付けたものと、取り付けないものとの２種類を用意しておいてもよいが、脱着用溝などを設けて簡単に脱着可能な構成としてもよい。

（実施の形態２９）図５７は、本発明にかかる第２９の実施の形態におけるアンテナ装置の構成の例を示す模式図である。前述までの実施の形態のアンテナ装置は、設置スペースを小さくできるように折曲げたエレメントを用いていたが、本実施の形態は、自動車などに取り付けられた細長い構成部材に設置可能なように、直線形状のエレメント、あるいは構成部材の形状に沿うように合わせた形状のエレメントを用いたものである。

【０１２６】図５７（ａ）は、細長い板状の導電体地板５７０１の表面に３素子の直線状のアンテナ５７０２を近接配置した例である。同図（ｂ）は、パイプ形状の導電体地板５７０３の表面に３素子の直線状のアンテナ５７０４を、各エレメントが導電体地板５７０３から等距離となるように近接配置した例である。同図（ｃ）は、四角の筒形状の導電体地板５７０５の表面に３素子の直線状のアンテナ５７０６を、各エレメントが導電体地板５７０５から等距離になるように近接配置した例である。

【０１２７】また、図５８は、図５７の例で、導電体地板の形状が湾曲あるいは折曲がったものの場合に、その形状に沿ってエレメントを湾曲あるいは折曲げた例を示す図であり、図５８（ａ）は、湾曲したパイプ形状の導電体地板５８０１の表面に同様に湾曲した３素子のアンテナ５８０２を、各エレメントが導電体地板５８０１から等距離になるように近接配置した例である。同図（ｂ）は、途中で折れ曲がった四角の筒形状の導電体地板５８０３の表面に同様に折れ曲がった３素子のアンテナ５８０４を、各エレメントが導電体地板５８０３から等距離になるように近接配置した例である。同図（ｃ）は、途中で折れ曲がった板状の導電体地板５８０５の表面に同様に折れ曲がった３素子のアンテナ５８０６を近接配置した例である。

【０１２８】また、図５９（ａ）は、円筒状の導電体地板５９０１の表面の周囲に沿って設置したアンテナ５９０２の例を示し、同図（ｂ）は、球状の導電体地板５９０３の表面の周囲に沿って設置したアンテナ５９０４の例を示す。

【０１２９】尚、本実施の形態では、導電体地板である構成部材の外側にアンテナを設置する場合を説明したが、これに限らず、板状部材の内側、筒形状部材などの内部にアンテナを設置する構成としてもよい。

【０１３０】図６３及び図６５は、本実施の形態におけるアンテナ装置の適用例を示す図である。図６３は、車体６３０１の屋根上の細長いルーフレール６３０３の表面にアンテナ６３０２を設置した例を示し、図６５は、

車体６５０１の屋根上の細長いルーフレール６５０３の内部にアンテナ６５０２を設置した例を示す。

【０１３１】また、図６４及び図６６も、本実施の形態におけるアンテナ装置の適用例を示す図である。図６４は、車体６４０１の屋根上の細長いルーフボックス６４０２の表面にアンテナ６４０３を設置した例を示し、図６６は、車体６６０１の屋根上の細長いルーフボックス６６０２の内部にアンテナ６６０３を設置した例を示す。

（実施の形態３０）図６０（ａ）、（ｂ）は、本発明にかかる第３０の実施の形態におけるアンテナ装置の構成の例を示す模式図である。本実施の形態のアンテナ装置は、導電体地板６００１に接続されたアース端部に対し、相対的にエレメント長が長い３素子のアンテナ６００２とエレメント長が短い３素子のアンテナ６００３とを有する構成において、それらアンテナ６００２，６００３のそれぞれに給電点Ａ６００５，Ｂ６００４が設けられている。図６０（ｃ）に示すように、短い方のアンテナ６００３は相対的に周波数の高い帯域Ａバンドに同調し、長い方のアンテナ６００２は相対的に周波数の低い帯域Ｂバンドに同調することになり、１つのアンテナで２つの同調バンドに対応可能なアンテナを実現できる。なお、給電点Ａ６００５，Ｂ６００４は互いに接続されてもよい。

【０１３２】図６１（ａ）、（ｂ）は、アンバランスタイプのアンテナで２つの同調バンドを持つアンテナの例である。このアンテナは、一端が導電体地板６１０１に接続され、その導電体地板６１０１に近接して配置された４素子からなるアンテナであり、４素子のうち、相対的にエレメント長の長い２素子のアンテナ６１０２に給電点Ｂ６１０４を設定し、相対的にエレメント長の短い２素子のアンテナ６１０３に給電点Ａ６１０５を設定している。この構成により前述と同様、図６１（ｃ）に示すように、周波数の高いＡバンドと周波数の低いＢバンドの２つの同調バンドに対応できる。なお、給電点Ａ６００５，Ｂ６００４は互いに接続されてもよい。

【０１３３】図６２（ａ）、（ｂ）は、バランスタイプのアンテナで２つの同調バンドを持つアンテナの例である。このアンテナは、中央点が導電体地板６２０１に接続され、その導電体地板６２０１に近接して配置された４素子からなるアンテナであり、４素子のうち、相対的にエレメント長の長い２素子のアンテナ６２０２に給電点Ｂ６２０４を設定し、相対的にエレメント長の短い２素子のアンテナ６２０３に給電点Ａ６２０５を設定している。この構成により前述と同様、図６２（ｃ）に示すように、周波数の高いＡバンドと周波数の低いＢバンドの２つの同調バンドに対応できる。なお、給電点Ａ６００５，Ｂ６００４は互いに接続されてもよい。

【０１３４】このように、本実施の形態によれば、アンテナ装置の設置スペースを最小限に抑えて、複数の同調バンドに対応できる性能のよいアンテナ装置を提供できるので、自動車や携帯電話などの狭い場所にも適用可能である。

【０１３５】なお、本実施の形態では、同調バンドを２つとしたが、これに限らず、３つ以上のバンドに対応できるように構成してもよい。その場合は、各同調バンドに対応するエレメント長を有する複数のアンテナを設け、それぞれのアンテナに給電点を設定すればよい。

（実施の形態３１）図６７は、本発明にかかる第３１の実施の形態のアンテナ装置の一例を示す略示構成図である。本実施の形態のアンテナ装置は、導電体地板６７０２に近接して設けられたコ字型のアンテナ素子６７０１の途中にコイル６７０３が挿入され、アンテナ素子６７０１の一端が導電体地板６７０２に接続された構成になっている。また、給電部６７０４はコイル６７０３と導電体地板６７０２との間のアンテナ素子６７０１の途中に設けられている。この構成によれば、コイルに電流が集中することになり、アンテナ装置をゲインは不変で小型化することができる。例えば、アンテナ素子の部分をストリップ線路で構成するとアンテナの面積は１／４と小さくなる。また、帯域幅が狭くなり帯域特性が鋭くなる。

【０１３６】又、図６８は、図６７の構成のアンテナ素子を２つ並列に接続して帯域合成したものである。すなわち、素子の途中にコイル６８０３ａ，６８０３ｂがそれぞれ挿入された２つの帯域（長さ）の異なるアンテナ素子６８０１ａ，６８０１ｂが並列に配置されて各々の一端が導電体地板６８０２に接続され、各アンテナ素子６８０１ａ，６８０１ｂは、それぞれリアクタンス素子６８０５ａ，６８０５ｂを介して給電部６８０４に共通接続されている。この構成により、２つのアンテナ素子の帯域を合成することができ、上記効果に加えてアンテナ装置を広帯域化することができる。

（実施の形態３２）図６９は、本発明にかかる第３２の実施の形態のアンテナ装置の一例を示す略示構成図である。本実施の形態のアンテナ装置は、導電体地板６９０２に近接して設けられたコ字型のアンテナ素子６９０１の一端と導電体地板６９０２との間にコイル６９０３が挿入され、そのコイル６９０３の他端が導電体地板６９０２に接地された構成になっている。また、給電部６９０４はアンテナ素子６９０１の途中に設けられている。この構成によれば、前述の第３２の実施の形態と同様コイルに電流が集中することになり、アンテナ装置をゲインは不変で小型化することができる。

【０１３７】又、図７０は、図６９の構成のアンテナ素子を２つ並列に接続して帯域合成したものである。すなわち、２つの帯域（長さ）の異なるアンテナ素子７００１ａ，７００１ｂが並列に配置されて各々の一端がコイル７００３の一端に共通接続され、そのコイル７００３の他端が導電体地板７００２に接続されている。また、

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各アンテナ素子７００１ａ，７００１ｂは、それぞれリアクタンス素子７００５ａ，７００５ｂを介して給電部７００４に共通接続されている。この構成により、２つのアンテナ素子の帯域を合成することができ、上記効果に加えてアンテナ装置を広帯域化することができる。また、コイルを２つのアンテナ素子で共通化しているので、コイルは１個でよく構成が簡単になる。

（実施の形態３３）図７１は、本発明にかかる第３３の実施の形態のアンテナ装置の例を示す模式図である。本実施の形態が上記第３２の実施の形態と異なる点は、図７１に示すように、導電体地板７１０２上に絶縁体７１０５を設けて、その絶縁体７１０５上でアンテナ素子７１０１とコイル７１０３とを接続した点である。この構成により、コイル７１０３の設置が楽になり実装するのに便利であり、コイルを安定に設置できる。また、図７２は、２つのアンテナ素子７２０１ａ，７２０１ｂによる帯域合成を行う構成の例であり、アンテナ素子の個数が多くなってコイル７２０３との接続が煩雑になるが、導電体地板７２０２上の絶縁体７２０５上に接続点を設けているので、アンテナ素子とコイルとの接続が更に容易になる。

（実施の形態３４）図７３は、本発明にかかる第３４の実施の形態のアンテナ装置の例を示す模式図である。本実施の形態のアンテナ装置は、コイル部分を２つに分割するとともに、導電体地板７３０２上に設けた２つの絶縁体７３０５ａ，７３０５ｂを利用してアンテナ素子やコイルなどを接続している。すなわち、導電体地板７３０２に近接して設けられたコ字型のアンテナ素子７３０１の一端とコイル７３０３ａの一端とを絶縁体７３０５ａ上で接続し、そのコイル７３０３ａの他端ともう１つのコイル７３０３ｂの一端及び給電部７３０４とをもう１つの絶縁体７３０５ｂ上で接続し、コイル７３０３ｂの他端を導電体地板７３０２に接地した構成である。また、図７４は、２つのアンテナ素子７４０１ａ，７４０１ｂを用いた帯域合成用のアンテナ装置であり、アンテナ素子、コイル及び給電部を図７３と同様に接続したものである。

【０１３８】これらの構成によれば、給電部の端子を回路基板上に設けているので、他の回路部品との接続が容易になる。

（実施の形態３５）図７５は、本発明にかかる第３５の実施の形態におけるアンテナの構成の例を示す模式図である。本実施の形態のアンテナ装置は、図６７の構成におけるコイルの代わりにジグザグ状のパターン７５０３をアンテナ素子７５０１に挿入した構成である。コイルを用いた構成では、形状が３次元的に広がるが、このパターン７５０３を用いれば、アンテナ素子７５０１と同一平面上に形成でき、プリント配線方法などよって作製可能になる。また、図７６は、２つのアンテナ素子７６０１ａ，７６０１ｂを用いた帯域合成型を示し、各アンテナ素子７６０１ａ，７６０１ｂのそれぞれにジグザグ状パターン７６０３ａ，７６０３ｂを挿入したものである。尚、このパターンは図７８（ｃ）に示すようなノコギリ波状のパターンなどであってもよい。

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（実施の形態３６）図７７は、本発明にかかる第３６の実施の形態におけるアンテナの構成の例を示す模式図である。本実施の形態のアンテナ装置は、導電体地板７７０２に近接して配置されたアンテナ素子７７０１全体をジグザグ状パターンに形成し、そのアンテナ素子７７０１の一端に、一端が接地されたコイル７７０３の他端を接続した構成である。給電部７７０４はジグザグ状のアンテナ素子の途中に設けられている。この構成によれば、損失は増加するが、アンテナ装置を例えば、１／６や１／８と更に小型化できる。また、アンテナ素子の形状は、これ以外に例えば、図７８の（ｂ）、（ｃ）に示すようなパターン形状でもよい。図（ｂ）は、３次元的なコイル状のものである。

（実施の形態３７）図７９は、本発明にかかる第３７の実施の形態におけるアンテナの構成の例を示す模式図である。本実施の形態のアンテナ装置は、導電体地板７９０２上に絶縁体７９０４を設け、この絶縁体７９０４上で、アンテナ素子７９０１から引き出したリード線７９０５と給電部７９０３とを接続したものである。この構成により、給電部７９０３が回路基板上に設けられるので他の回路部品との接続が容易になる。

【０１３９】また、図８０は、導電体地板８００２に貫通孔８００５を設けてアンテナ素子８００１が存在する側とは反対側の導電体地板８００２上に絶縁体８００４を設けた構成である。そして、アンテナ素子８００１から引き出したリード線８００６を貫通孔８００５及び絶縁体８００４に通して給電部８００３を、絶縁体８００４上で接続している。これにより、導電体地板８００２の裏側で回路部品を接続できるので、上記図７９の構成より更に、給電部８００３に接続する他の回路部品の取り扱いが便利になる。

【０１４０】また、図８１は、上記図８０の構成において、導電体地板の裏面（アンテナ素子とは反対面）に別の導電体板を設け、その導電体板に各種の回路部品を実装するものである。すなわち、導電体地板８１０２及び導電体板８１０５に、アンテナ素子８１０１から引き出したリード線８１１１を通す貫通孔８１０４を形成し、その貫通孔８１０４の導電体板８１０５側に絶縁体８１０３を設ける。又、導電体板８１０５の表面には、各種の回路部品を接続するための絶縁体８１０６を必要な数だけ設ける。そして、リード線８１１１を貫通孔８１０４を経て絶縁体８１０３に接続し、回路部品８１０７～８１１０を、絶縁体８１０３や各８１０６上に接続する。

【０１４１】この構成によれば、回路をアンテナのすぐ近くに配置することができ、アンテナと回路とのシール

ドも導電体板を用いて簡単に行え、機器の小型化に有効である。

【０１４２】また、図８２は、回路部品をアンテナ素子側に配置した構成の例である。すなわち、導電体地板８２０２上にアンテナ素子８２０１から引き出したリード線８２０５を接続するための絶縁体８２０３、及び各種の回路部品を接続するための絶縁体８２０６を必要な数だけ設ける。更に、アンテナ素子８２０１と導電体地板８２０２の間を遮弊できるように導電体のシールドケース８２０４を導電体地板８２０２上に設け、リード線８２０５を通す貫通孔８２０７を形成する。そして、リード線８２０５を貫通孔８２０７を通して絶縁体８２０３上に接続し、絶縁体８２０３及び各８２０６上に回路部品８２０８～８２１０を接続する。又、アンテナ素子８２０１の一端はシールドケース８２０４に接地する。

【０１４３】この構成によれば、回路はアンテナ素子と導電体地板との間に納まるが、シールドケースによりシールドされ、上記図８１の場合よりも更に、機器を小型化できる。

（実施の形態３８）図８３は、本発明にかかる第３８の実施の形態におけるアンテナの構成の例を示す模式図である。本実施の形態のアンテナ装置は、絶縁体板８３０５の一方の表面にアンテナ素子８３０１をパターン形成し、そのアンテナ素子８３０１の一端部８３０７は絶縁体板８３０５を貫通させ、又、アンテナ素子８３０１の途中から、絶縁体板８３０５を貫通するリード線８３０３を引き出し、そのリード線８３０３に、絶縁体板８３０５の反対面にアンテナ素子８３０５と平行にパターン形成したリード線８３０６を接続し、そのリード線８３０６に給電部８３０４を接続する。ここで、給電部８３０４はアンテナ素子８３０１の一端部８３０７に接近した位置に設ける。そして、絶縁体板８３０５と導電体地板８３０２とを平行に配置して、アンテナ素子８３０１の一端部８３０７を導電体地板８３０２に接続したものである。

【０１４４】このような構成によれば、アンテナ素子の接地部分と給電部とが接近するので、同軸ケーブルを接続する場合などに便利である。

【０１４５】（実施の形態３９）図８４は、本発明にかかる第３９の実施の形態におけるアンテナの構成の例を示す模式図である。本実施の形態のアンテナ装置は、広い導電体地板８４０２上に絶縁体板８４０５を介して別の導電体地板８４０４を設けて、その導電体地板８４０４に近接してアンテナ素子８４０１を配置したものである。ここで、アンテナ素子８４０１の一端は導電体地板８４０４に接地する。又、導電体地板８４０４の大きさはアンテナ素子８４０１の面積と同等にするのがよい。導電体地板８４０２は具体的には、自動車や電車のボディー、受信機や通信機の金属ケース部、家屋の金属構造部などが挙げられ、設置方法は、車室内あるいは車室外のどちらでもよい。

【０１４６】このような構成によれば、最大ゲインを持つ仰角が水平に近くなり、横からくる通信用電波（垂直偏波）に対して好適である。

【０１４７】なお、上記第３１から第３９までの実施の形態のアンテナ装置についても、図３６、４７、４８、５２、５３、５４等で説明したような場所に設置して使用できることは言うまでもない。

【０１４８】また、上記第３１から第３９までの実施の形態では、アンテナ素子の本数が１本あるいは２本として説明したが、これに限らず、アンテナ素子の本数が３本以上の構成であってももちろん良い。

【０１４９】また、上記第３１から第３９までの実施の形態では、アンテナ素子の形状をコ字型として説明したが、これに限らず、例えばループ状など他の形状であっても良い。

【０１５０】また、上記第３７から第３９までの実施の形態において示した絶縁体を用いて接続点を設ける構成は、上述した他の実施の形態の全てのアンテナ装置に適用可能である。

（２）次に、本発明にかかるディジタルテレビジョン放送受信装置の、アンテナ以外の部分を中心に説明する。

【０１５１】（実施の形態４０）図９７は本発明の実施の形態４０によるデジタルテレビジョン放送受信装置の構成を示すブロック図である。図９７において、９００１は入力手段、９００２は遅延手段、９００３は合成手段、９００４は受信手段、９００５は復調手段、９００７は遅延波推定手段、９００８は位置情報判定手段、９００９は車両情報検出手段である。図９７に従って移動体でのデジタルテレビジョン放送の受信動作を説明する。

【０１５２】テレビジョン放送の電波は受信アンテナ等の入力手段９００１によって電気信号に変換され、遅延手段９００２および合成手段９００３に伝達される。電気信号に変換されたテレビジョン放送の信号は遅延手段９００２によって、合成制御手段９００６からの遅延制御信号に応じて遅延させられ、合成手段９００３に伝達される。合成手段９００３においては、合成制御手段９００６からの合成制御信号に応じて、入力手段９００１より得られた信号および遅延手段９００２より得られた信号のそれぞれに利得（ゲイン）をつけて合成し、受信手段９００４に伝達する。ここで合成手法としては、加算や最大値選択などの簡単な操作を用いることが可能である。

【０１５３】受信手段９００４では、合成手段９００３からの信号より必要な周波数帯域の信号のみを抽出し、復調手段９００５で処理可能な周波数の信号に変換して復調手段９００５に伝達し、復調手段９００５で信号を復調し出力する。一方、復調手段９００５は復調情報を遅延波推定手段９００７に伝達し、遅延波推定手段９０

０７では復調手段９００５より得られる復調情報をもとに受信波に含まれている遅延波を推定する。

【０１５４】ここで復調及び遅延波推定の方法を説明する。現在、放送方式の標準化活動が行われている日本の地上デジタル放送においては、変調方式としてＯＦＤＭ（直交周波数分割多重方式）が用いられ、復調手段９００５においてはＯＦＤＭ復調を行い、送信された符号を復号する処理を行う。この復号過程でＦＦＴなどを用いた周波数分析を行い、またデータの復調を行うために信号中に種々のパイロット信号が含まれており、それらのパイロット信号を用いて信号の伝達特性を推定することが可能である。例えばＦＦＴによって周波数分析された結果の周波数成分のディップ位置やディップ数を検出することで、遅延時間を検出することができる。

【０１５５】図１０３はＯＦＤＭにおける周波数分析の例を示したものであり、遅延波が存在しないときは周波数特性はフラットとなるが、遅延波が存在する場合には図１０３に示すようにいくつかの周波数成分にディップが存在する。また、パイロット信号の信号変化やパイロット信号の欠落を観測することで遅延波を検出することが可能である。また、ＦＦＴ処理後の誤り訂正処理から誤りのあるデータ位置情報を獲得し、それに基づいて妨害波の遅延時間を推定することも可能である。なお、以上の説明では日本のデジタル放送方式について説明したが、これに限らずアナログ放送及び各国のデジタル放送についても適用が可能であることは言うまでもない。

【０１５６】次に、合成および遅延の制御について説明する。合成制御手段９００６では、遅延波推定手段９００７で推定された遅延波情報に基づいて、遅延手段９００２および合成手段９００３を制御するための信号を出力する。合成制御手段９００６の一構成例によるゲイン制御手段９０６１と遅延時間制御手段９０６２を持つ場合について説明する。ゲイン制御手段９０６１では遅延波推定手段９００７から得られる遅延波情報に基づき合成手段９００３での合成ゲインを設定する。この設定方法として図１０４を用いて説明する。図１０４の横軸は遅延波の大きさ、縦軸は入力手段９００１からの信号のゲイン（信号Ａゲイン）と遅延手段９００２からの信号のゲイン（信号Ｂゲイン）の比率（＝信号Ａゲイン／信号Ｂゲイン）を示すものとする。遅延波レベルが大きく特に直接波とレベルが同程度の場合には両方のゲインが同じになるように、また遅延波レベルが小さいとき、あるいは遅延波レベルが直接波レベルより大きい場合には、遅延手段からの信号のゲインまたは入力手段からの信号を小さくしてゲイン差を設けて合成するように制御する。さらに、遅延波推定手段９００７から得られる遅延波の遅延時間に基づいてゲイン制御を行う場合には、遅延時間が大きい場合（図１０４中のａ）と小さい場合（図１０４中のｂ）では図に示すように遅延時間が大きい方がゲイン差を大きくする様に制御する。

【０１５７】次に遅延時間制御手段９０６２の動作を説明する。遅延手段９００２で遅延させるべき遅延時間の設定は、遅延波推定手段９００７にて推定された遅延時間とほぼ同じ時間を遅延手段９００２で遅延させるように制御する。このとき、例えば遅延波と復調信号のエラー率の関係は図１０５に示す様に遅延時間が小さい場合（Ｂ点：約２．５μｓ以下）には急激に悪化する可能性があるため、遅延波推定手段９００７で求められた遅延時間が小さい場合には求められた遅延時間でなく固定の遅延時間、例えば図１０５のＢ点以上の遅延時間を設定することで効果的にエラー率の悪化を回避できる。ただし、ここで与える遅延時間の上限はＯＦＤＭ信号に付加されるガード期間よりも短くする必要がある。また、このような遅延時間の小さい遅延波によるエラーレートの悪化が発生することを事前に防ぐために遅延手段９００２においては決められた遅延時間を常に設定することも可能である。この場合の設定値として例えばＢ点の約２倍の値を設定すれば確実に短い遅延時間の影響を除くことができる。また、図９７に示すように１本のアンテナから信号が得られる場合には、受信信号の帯域幅の逆数よりも小さい遅延時間を信号に与え加算し、受信信号のノイズレベルを低減させエラー率を改善することが可能である。これは、加算した信号により発生するディップ位置が信号帯域幅の外にできるためである。例えば、信号帯域幅が５００ｋＨｚであれば、与える遅延時間は、２μｓ以下とする必要がある。上記の短い遅延時間を与えた信号を加算する方法は、特に、移動受信向けのサービス放送として用いられる狭帯域放送において、信号帯域の受信レベルを向上させる効果があるため有効な手段である。

【０１５８】次に、車両情報検出手段９００９の用い方について説明する。車両情報検出手段９００９は、移動受信している車両の情報を検出する。例えば速度（車速）検出手段９０９１において移動受信を行っている車両速度の検出、及び位置検出手段９０９２において位置を検出する構成が考えられる。車両情報検出手段９００９としてナビゲーション装置が使用できることは言うまでもなく、また位置検出装置としてはＧＰＳ装置の使用、あるいはＰＨＳ、携帯電話、あるいはＶＩＣＳなどの道路管制システムなどによるロケーション検出なども利用可能である。検出した車両情報は位置情報判定手段９００８に伝達される。

【０１５９】位置情報判定手段９００８では、受信している位置においてはどこの放送局から電波を受ける可能性があるかを調べ、それらの放送局からの距離あるいは山やビルなどによる反射を考慮して、受信地点での遅延時間あるいは電波の強さを推定する。このためには放送局、あるいは中継局等の送信局から送られる周波数および送信局の位置、あるいは送信出力等の情報をあらかじめ持つかあるいは放送または電話等の通信手段によりダ

ウンロードして記憶しておき、車両情報検出手段９００９からの位置情報と比較して求める。これにより受信地点での遅延波時間、及び大きさを求めることができる。

【０１６０】さらに受信地点の周囲のビルの位置、大きさ、高さなどの情報を放送局位置とともに地図に示し、これらによる反射等を考慮することでより正確に遅延波時間および大きさを知ることができる。これらの送信所、ビル、山などの情報を扱う装置としてはナビゲーションなどのシステムが使用できることは言うまでもない。また、速度検出手段９０９１により移動受信の速度がわかるため次にあらわれる遅延波を予測できるため、より早く遅延波に追従することが可能になる。

【０１６１】合成制御手段６においては、以上のようにして位置情報判定手段９００８で求められた遅延波情報をもとに合成ゲイン制御、遅延時間制御を行う。この場合の制御方法としては遅延波推定手段９００７による遅延波情報を用いた時と同じように行うことができる。さらに遅延波推定手段９００７、位置情報推定手段８の情報を組み合わせて使用することも可能であり、この場合は２つの遅延情報が近い場合にのみゲイン、遅延時間制御を行うことも、あるいは２つの遅延情報が離れている場合は現状維持あるいは遅延波レベルの大きい情報に基づいて制御を行うことが可能である。上記の説明では車両情報検出手段９００９を設けて移動受信する場合について説明してきたが、位置検出手段９０９２のみを用いて移動受信、及び固定受信で使用することも可能である。

【０１６２】以上の説明では図９７の構成による入力手段を１つとした場合の構成についてとしたが、複数の入力手段、及びそれぞれの入力手段に応じた遅延手段を設ける図９８における構成も移動受信には有効な構成である。この場合には、それぞれの入力手段では同じ放送電波を受けた場合においてもマルチパス干渉の状態が異なるため、それぞれ異なる入力信号が得られ、これにより図１０３に示したようなディップの位置（周波数）および深さがそれぞれ違う場所に発生する。従って、複数の異なる入力信号を加え合わせることでディップ位置やディップの深さが異なる信号が得られ、結果的に信号のエラー率を下げることが可能となる。図９８における受信動作は図９７で述べた動作とほぼ同等である。遅延手段９００２および合成手段９００３の制御として、求められた遅延時間が遅延手段１から遅延手段Ｎで相対的に設定される様に適当に与え、ゲインの設定を遅延された信号に応じて行うことで実現できる。また、複数のアンテナの設置位置間隔がベースバンドの波長よりも十分に短い場合には、複数入力信号をベースバンド帯域で加算することで受信信号レベルを改善することができる。

【０１６３】以上のように、実施の形態４０におけるデジタルテレビジョン放送受信装置によれば、信号を合成することで信号のディップを軽減できその結果デジタルデータのエラー率を改善できる効果がある。また遅延時間の設定を遅延時間の短い信号の影響を避けるように設定することで、エラー率の劣化を防ぐことができる。また遅延波推定手段、および車両情報検出手段と位置情報判定手段によって正確な遅延波を求めることで更に正確に信号のディップを避け、これによってエラー率の一層の改善が得られるという効果を有する。

【０１６４】一方、複数アンテナから得られた信号をそのエラー状況に従い切り換えながら利用することも可能である。図１０６を用いて、アンテナを切り換える場合のアンテナ切換条件を説明する。まず、入力された信号のＣ／Ｎ比と例えば１フレーム期間など過去一定期間を求め、Ｃ／Ｎ比が大きくエラー率が低い場合にはアンテナの切換は行わない。また、エラー率が高い場合でも、エラーの発生が短時間のバースト的なものであり継続的ではない場合にも、アンテナ切換は行わない。一方、アンテナ切換は、入力信号のＣ／Ｎレベルが低下したり、エラー率が高い状態が継続する場合に行う。ここで、アンテナの切換タイミングは、ＯＦＤＭ信号に付加されたガードインターバル期間とすることが考えられる。車速情報や位置情報などと組み合わせてアンテナ切換を行うタイミングを計算することも可能である。なお、アンテナの切換タイミングは、ＯＦＤＭ信号に付加されたガードインターバル期間とすることが考えられる。これにより、移動受信時における受信条件の変化に対して最適にアンテナを切り換えることが可能となる。また、図９７、図９８において入力手段の構成としてアンテナ９０１１、及び増幅手段９０１２を設置することで信号の減衰、あるいは分配による整合ロスを防ぎ以降の処理を正確に行うことができる。

【０１６５】（実施の形態４１）図９９は本発明の実施の形態４１によるデジタルテレビジョン放送受信装置の構成を示すブロック図である。図９９において、９００１は入力手段、９００２は遅延手段、９００３は合成手段、９００４は受信手段、９００５は復調手段、９００７は遅延波推定手段、９００８は位置情報判定手段、９００９は車両情報検出手段である。図９９に示す実施の形態４１の構成は上述した実施の形態４０の構成と比較すると、受信手段９００４が実施の形態４１では入力手段９００１の直後に接続されている点が異なる。以下、実施の形態４１における移動体でのデジタルテレビジョン放送の受信動作を説明する。

【０１６６】テレビジョン放送の電波は受信アンテナ等の入力手段９００１によって電気信号に変換され、受信手段９００４に伝達される。受信手段９００４では、入力手段９００１から得られる信号より必要な周波数帯域の信号のみを抽出し、遅延手段９００２および合成手段９００３に伝達する。受信手段９００４で得られた信号は遅延手段９００２によって合成制御手段９００６からの遅延制御信号に応じて遅延されて合成手段９００３に

伝達される。合成手段９００３においては、合成制御手段９００６からの合成制御信号に応じて、受信手段９００４から得られた信号および遅延手段９００２から得られた信号のそれぞれに利得（ゲイン）をつけて重みづけし合成して復調手段９００５に伝達する。ここで合成手法としては実施の形態４０の場合と同様に、加算や最大値などの単純な操作を用いることが可能である。復調手段９００５では信号を復調して出力する。

【０１６７】一方、復調手段９００５からの復調情報および車両情報検出手段９００９から得られる移動受信情報から、実施の形態４０と同様に、それぞれ遅延波推定手段９００７および位置情報判定手段９００８において遅延波を推定し合成制御手段９００６に伝達して、合成制御手段９００６において遅延手段９００２および合成手段９００３への制御信号を求める遅延および合成を制御する。上記受信動作において合成制御手段の動作、車両情報検出手段の動作の詳細な動作は実施の形態４０と同様である。実施の形態４１による受信装置によれば、遅延手段９００２あるいは合成手段９００３の処理は、前段の受信手段９００４により周波数および帯域を制限されているために処理を簡略化することが可能でありながら、実施の形態４０と同等な効果が得られる。

【０１６８】また図１００に示すように、入力手段９００１、受信手段９００４、遅延手段９００２をそれぞれ複数設置して受信する方法もある。この図１００に示す構成の動作は上記に説明した実施形態と同様であるので詳細な説明は省略する。入力手段９００１、受信手段９００４，遅延手段９００２を複数設置することで、それぞれの入力手段では同じ放送電波を受けていた場合にも干渉の状態が相違しそれぞれ異なる入力レベルとなり、これにより図１０３に示したようなディップの位置（周波数）および深さがそれぞれ違う場所に発生する。従って複数の異なる入力を加え合わせることで、ディップ位置とディップの深さが異なり結果的に信号のエラー率を下げることが可能となる。

【０１６９】（実施の形態４２）図１０１は本発明の実施の形態４２によるデジタルテレビジョン放送受信装置の構成を示すブロック図である。図１０１において、９００１は入力手段、９００４は受信手段、９００５は復調手段、９００７は遅延波推定手段、９０５５は復調制御手段、９００８は位置情報判定手段、９００９は車両情報検出手段である。以下、図１０１に従って移動体で、あるいは固定場所でのデジタルテレビジョン放送の受信動作を説明する。

【０１７０】テレビジョン放送の電波は、受信アンテナ等の入力手段９００１によって電気信号に変換され、受信手段９００４に伝達される。受信手段９００４では入力手段９００１から得られる信号より必要な周波数帯域の信号のみを抽出し、復調手段９００５に伝達される。復調手段では受信手段９００４からの信号を復調してデジタル信号を出力するとともに遅延波推定手段９００７に復調状況を伝達する。

【０１７１】ここで復調手段９００５の動作を詳しく説明する。復調手段９００５として周波数分析手段９０５１、調整手段９０５２、復号化手段９０５３からなる一構成例について動作を説明する。受信手段９００４から得られる信号は周波数分析手段９０５１でＦＦＴ、リアルＦＦＴ、ＤＦＴ、ＦＨＴなどの周波分析手法によって周波数分析を行われ周波数軸上の信号に変換されて調整手段９０５２に伝達される。調整手段９０５２では復調調整手段９０５５からの制御信号に基づいて周波数分析手段９０５１で得られた周波数軸上の信号を操作する。操作方法として復調制御手段９０５５からの信号に基づいで伝達関数を周波数分析手段９０５１で得られた信号にかける方法や、フィルタを構成して演算する方法や、特定の周波数成分を強調、あるいは欠落したと考えられる周波数成分を補間するなど手法が考えられる。調整手段９０５２で得られた信号を復号化手段９０５３でデジタル符号に復号する。遅延波推定手段９００７では復調手段９００５から得られる信号に基づいて遅延波を推定する。このとき参照とする信号としては周波数分析手段９０５１から得られる周波数スペクトル、復号化手段９０５３の復号過程で得られるパイロット信号などがある。受信信号の周波数スペクトルは図１０３に示すように遅延波の存在に応じてディップ等を生じる。デジタルテレビジョン放送で用いられるＯＤＦＭ変調方式においては周波数スペクトラムがフラットになることより遅延波の大きさ、遅延時間を推定することが可能である。また、パイロット信号の位相変化あるいは欠落からも遅延波の大きさ、遅延時間の推定ができる。復調制御手段９０５５では遅延波推定手段９００７あるいは位置情報判定手段９００８から得られた遅延波情報に基づいて調整手段９０５２を制御する。制御方法としては調整手段９０５２に応じた制御パラメータを決めて伝達することになるが、例えば調整手段９０５２に伝達関数をかける場合には復調制御手段９０５５で遅延波に応じた伝達関数を求めて伝達する。あるいはフィルタの場合はフィルタ係数、補間の場合は補間値を伝達する。ここで位置情報判定手段９００８，及び車両情報検出手段９００９は実施の形態４０および４１と同等であるため、詳細な説明は省略する。

【０１７２】以上のように、本実施の形態によれば、調整手段９０５２によって遅延波の影響が少なくなるように動作するために、正確な復号が可能になり受信したデジタル信号のエラー率が改善される効果を有する。

【０１７３】図１０２に入力手段９００１を複数用いた構成を示す。この場合には入力手段の数に応じて受信手段が必要であり、さらに周波数分析手段も複数必要となる。調整手段、復号化手段については処理する信号を選択することで複数必要でない場合もある。なお、図１０

２においては、周波数分析手段９０５１、調整手段９０５２、復号化手段９０５３の各ブロックは表現を簡単にするために１つとしているが、上述したようにこれらの各手段は入力手段の数に応じて複数個の手段を具備しているものとする。

【０１７４】図１０２の構成の場合には各入力手段ごとに周波数分析が行われるために、遅延波の大きさ、遅延時間が各入力手段ごとに推定できる。従って調整手段９０５２で最も受信状態の良い信号を選択することが可能である。また、各信号毎に上述したような伝達関数、フィルタあるいは補間などの調整を行い、それぞれ復号化手段９０５３で復号することも可能である。復号手段９０５３，あるいは調整手段９０５２では、各入力手段からの信号の周波数分析結果から受信状態のよい周波数スペクトルの信号のみを選択して処理することで、良好なデジタル符号の復調が可能になる。以上述べたように、図１０２の構成では複数の入力手段を設けることで、より受信エラーを改善できる。

【０１７５】なお、上述した各種本発明のデジタルテレビジョン放送受信装置において、アンテナが複数のアンテナ素子を有する場合は、それぞれアンテナ素子をその角度を互いに異なるように設計することによって、異なる偏波面の電波に対して最大ゲインを有するように、設置することができる。

【０１７６】

【発明の効果】以上述べたところから明らかなように本発明にかかるディジタルテレビ放送受信装置におけるアンテナ装置は、自動車などの車体近傍に、あるいは車体と一体化して平面上に設置でき、かつ狭い場所でも配置ができるよう小型化が可能であるので便利である。

【０１７７】また、本発明におけるデジタルテレビジョン放送受信装置においては、入力信号を入力直後あるいは受信後に信号を遅延させて合成することにより、入力信号に含まれる遅延波による障害を軽減し、復調後のエラー率を改善する効果がある。

【０１７８】本発明におけるデジタルテレビジョン放送受信装置においては、上記の遅延して合成する制御のために復調した信号あるいは復調過程の信号から遅延時間と遅延量を求め、その推定遅延量および時間を用いて合成および遅延の制御を行うことにより、的確に遅延波による障害を取り除くことができ、復調後のエラー率を更に改善できる。

【図面の簡単な説明】

【図１】本発明にかかる第１の実施の形態におけるアンテナ装置の例を示す模式図である。

【図２】同第１の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図３】本発明にかかる第２の実施の形態におけるアンテナ装置の例を示す模式図である。

【図４】同第２の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図５】本発明にかかる第３の実施の形態におけるアンテナ装置の例を示す模式図である。

【図６】同第３の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図７】同第３の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図８】同第３の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図９】本発明にかかる第４の実施の形態におけるアンテナ装置の例を示す模式図である。

【図１０】同第４の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図１１】同第４の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図１２】同第４の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図１３】本発明にかかる第５の実施の形態におけるアンテナ装置の例を示す模式図である。

【図１４】同第５の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図１５】本発明にかかる第６の実施の形態におけるアンテナ装置の例を示す模式図である。

【図１６】同第６の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図１７】同第６の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図１８】同第６の実施の形態におけるアンテナ装置の例を示す模式図である。

【図１９】本発明にかかる第７の実施の形態におけるアンテナ装置の例を示す模式図である。

【図２０】同第７の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図２１】同第７の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図２２】本発明にかかる第８の実施の形態におけるアンテナ装置の例を示す模式図である。

【図２３】同第８の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図２４】同第８の実施の形態におけるアンテナ装置におけるアンテナと導電体地板との位置関係を示す図である。

【図２５】本発明にかかる第９の実施の形態におけるアンテナ装置の例を示す模式図である。

【図２６】本発明にかかる第１０の実施の形態におけるアンテナ装置の例を示す模式図である。

【図２７】本発明にかかる第１１の実施の形態におけるアンテナ装置の例を示す模式図である。

【図２８】同第１１の実施の形態におけるアンテナ装置の別の例を示す模式図である。

【図２９】本発明にかかる第１２の実施の形態におけるアンテナ装置の例を示す模式図である。
【図３０】本発明にかかる第１３の実施の形態におけるアンテナ装置の例を示す模式図である。
【図３１】本発明にかかる第１４の実施の形態におけるアンテナ装置の例を示す模式図である。
【図３２】本発明にかかる第１５の実施の形態におけるアンテナ装置の例を示す模式図である。
【図３３】同第１５の実施の形態におけるアンテナ装置の別の例を示す模式図である。
【図３４】本発明にかかる第１６の実施の形態におけるアンテナ装置の例を示す模式図である。
【図３５】本発明にかかる第１７の実施の形態におけるアンテナ装置の例を示す模式図である。
【図３６】本発明にかかる第１８の実施の形態におけるアンテナ装置における設置場所の例を説明する外観図である。
【図３７】同第１８の実施の形態におけるアンテナ装置における設置場所の別の例を説明する外観図である。
【図３８】本発明にかかる第１９の実施の形態におけるアンテナ装置を備えた移動体通信装置の例を示す模式図である。
【図３９】本発明にかかる第２０の実施の形態におけるアンテナ装置を備えた携帯電話の例を示す模式図である。
【図４０】本発明における帯域合成の例を示す図である。
【図４１】本発明における利得累積の例を示す図である。
【図４２】本発明にかかる第２１の実施の形態におけるアンテナ装置を示す略示構成図である。
【図４３】同第２１の実施の形態におけるアンテナ装置の別の例を示す模式図である。
【図４４】本発明にかかる第２２の実施の形態におけるアンテナ装置の例を示す模式図である。
【図４５】本発明にかかる第２３の実施の形態におけるアンテナ装置の例を示す模式図である。
【図４６】本発明にかかる第２４の実施の形態におけるアンテナ装置の例を示す模式図である。
【図４７】本発明にかかる第２５の実施の形態におけるアンテナ装置における車体への適用例を示す外観図である。
【図４８】本発明にかかる第２６の実施の形態におけるアンテナの設置箇所の車体各部への適用例を示す外観図である。
【図４９】同第２６の実施の形態におけるアンテナの性質を説明する図である。
【図５０】本発明にかかる第２７の実施の形態におけるアンテナの構成を示す模式図である。
【図５１】同第２７の実施の形態におけるアンテナの別の構成を示す模式図である。
【図５２】同第２７の実施の形態におけるアンテナの設置箇所の車体各部への適用例を示す外観図である。
【図５３】同第２７の実施の形態におけるアンテナの携帯電話への適用例を示す外観図である。
【図５４】同第２７の実施の形態におけるアンテナの一般家屋への適用例を示す外観図である。
【図５５】本発明にかかる第２８の実施の形態におけるアンテナの構成を示す模式図である。
【図５６】同図（ａ）は、同第２８の実施の形態における別の例のアンテナの構成を示す模式図、同図（ｂ）は、その説明図である。
【図５７】本発明にかかる第２９の実施の形態におけるアンテナの構成の例を示す模式図である。
【図５８】同第２９の実施の形態における別の例のアンテナの構成を示す模式図である。
【図５９】同第２９の実施の形態におけるまた別の例のアンテナの構成を示す模式図である。
【図６０】同図（ａ）、（ｂ）は、本発明にかかる第３０の実施の形態におけるアンテナの構成の例を示す模式図、同図（ｃ）は、その周波数特性を説明する図である。
【図６１】同図（ａ）、（ｂ）は、同第３０の実施の形態における別の例のアンテナの構成を示す模式図、同図（ｃ）は、その周波数特性を説明する図である。
【図６２】同図（ａ）、（ｂ）は、同第３０の実施の形態におけるまた別の例のアンテナの構成を示す模式図、同図（ｃ）は、その周波数特性を説明する図である。
【図６３】第２９の実施の形態におけるアンテナ装置の適用例を示す図である。
【図６４】第２９の実施の形態におけるアンテナ装置の別の適用例を示す図である。
【図６５】第２９の実施の形態におけるアンテナ装置の又別の適用例を示す図である。
【図６６】第２９の実施の形態におけるアンテナ装置の更に別の適用例を示す図である。
【図６７】本発明にかかる第３１の実施の形態におけるアンテナの構成の例を示す模式図である。
【図６８】同第３１の実施の形態における別の例のアンテナの構成を示す模式図である。
【図６９】本発明にかかる第３２の実施の形態におけるアンテナの構成の例を示す模式図である。
【図７０】同第３２の実施の形態における別の例のアンテナの構成を示す模式図である。
【図７１】本発明にかかる第３３の実施の形態におけるアンテナの構成の例を示す模式図である。
【図７２】同第３３の実施の形態における別の例のアンテナの構成を示す模式図である。
【図７３】本発明にかかる第３４の実施の形態におけるアンテナの構成の例を示す模式図である。

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【図７４】同第３４の実施の形態における別の例のアンテナの構成を示す模式図である。
【図７５】本発明にかかる第３５の実施の形態におけるアンテナの構成の例を示す模式図である。
【図７６】同第３５の実施の形態における別の例のアンテナの構成を示す模式図である。
【図７７】本発明にかかる第３６の実施の形態におけるアンテナの構成の例を示す模式図である。
【図７８】同第３６の実施の形態における別のパターン例を示す模式図である。
【図７９】本発明にかかる第３７の実施の形態におけるアンテナの構成の例を示す模式図である。
【図８０】同第３７の実施の形態における別の例のアンテナの構成を示す模式図である。
【図８１】同第３７の実施の形態における別の例のアンテナの構成を示す模式図である。
【図８２】同第３７の実施の形態における別の例のアンテナの構成を示す模式図である。
【図８３】本発明にかかる第３８の実施の形態におけるアンテナの構成の例を示す模式図である。
【図８４】本発明にかかる第３９の実施の形態におけるアンテナの構成の例を示す模式図である。
【図８５】図２におけるアンテナ装置の具体的な構成を示す斜視図である。
【図８６】図８５のアンテナにおけるインピーダンス及びＶＳＷＲ特性を示す図である。
【図８７】図８５のアンテナにおける指向性ゲイン特性を示す図である。
【図８８】４素子のアンテナにおける帯域合成を説明するための一素子のＶＳＷＲ特性を示す図である。
【図８９】４素子のアンテナにおける帯域合成を説明するための他の一素子のＶＳＷＲ特性を示す図である。
【図９０】４素子のアンテナにおける帯域合成を説明するための他の一素子のＶＳＷＲ特性を示す図である。
【図９１】４素子のアンテナにおける帯域合成を説明するための他の一素子のＶＳＷＲ特性を示す図である。
【図９２】図８８から図９１までの４素子アンテナを帯域合成したときのＶＳＷＲ特性を示す図である。
【図９３】図９２における縦軸の範囲を大きくした場合のＶＳＷＲ特性を示す図である。
【図９４】図４４（ｂ）のアンテナにおけるアンテナアースと装置アースとの設置距離を変えたときの指向性ゲイン特性を示す図である。
【図９５】図５５（ａ）のアンテナにおける指向性ゲイン特性を示す図である。
【図９６】図５５（ｂ）のアンテナにおける指向性ゲイン特性を示す図である。
【図９７】本発明の実施の形態による、デジタルテレビジョン放送受信装置の構成を示すブロック図

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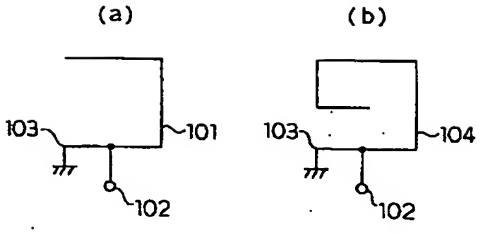
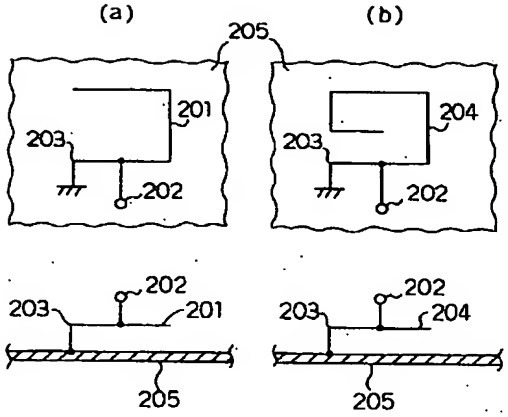
【図９８】本発明の他の実施の形態による、デジタルテレビジョン放送受信装置の構成を示すブロック図
【図９９】本発明の他の実施の形態による、デジタルテレビジョン放送受信装置の構成を示すブロック図
【図１００】本発明の他の実施の形態による、デジタルテレビジョン放送受信装置の構成を示すブロック図
【図１０１】本発明の他の実施の形態による、デジタルテレビジョン放送受信装置の構成を示すブロック図
【図１０２】本発明の他の実施の形態による、デジタルテレビジョン放送受信装置の構成を示すブロック図
【図１０３】受信時に遅延波の妨害を受けた場合の受信後の周波数分析結果を示す概念図
【図１０４】合成手段のゲイン制御を示す概念図
【図１０５】遅延波の遅延時間とエラー率を示した概念図
【図１０６】アンテナを切り換える場合のアンテナ切換条件を説明するための図
【符号の説明】

１０１、１０４	アンテナ素子（線状導電体）
１０２	給電端子
２０５	導電体地板
５０２、５０４	リアクタンス素子
１３０４	プリント基板
１５０５	凹部
１８０６	多層プリント基板
１９０１	給電点
３００３	誘電体
３２０３	コイル
３５０３	ダイバー切換スイッチ
３８０４	通信器
３８０５	車体
３９０２	シールドケース
４６０３	高誘電率材
５６０３、５６０６	強誘電体
９００１	入力手段
９００２	遅延手段
９００３	合成手段
９００４	受信手段
９００５	復調手段
９００６	合成制御手段
９００７	遅延波推定手段
９００８	位置情報判定手段
９００９	車両情報検出手段
９０１１	アンテナ
９０１２	増幅手段
９０６１	ゲイン制御手段
９０６２	遅延時間制御手段
９０９１	速度検出手段
９０９２	位置検出手段

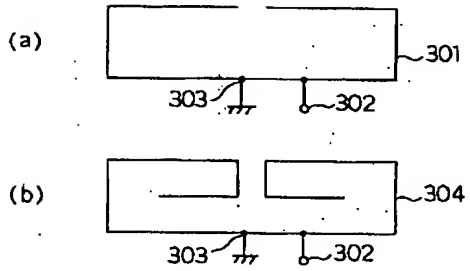
【図１】



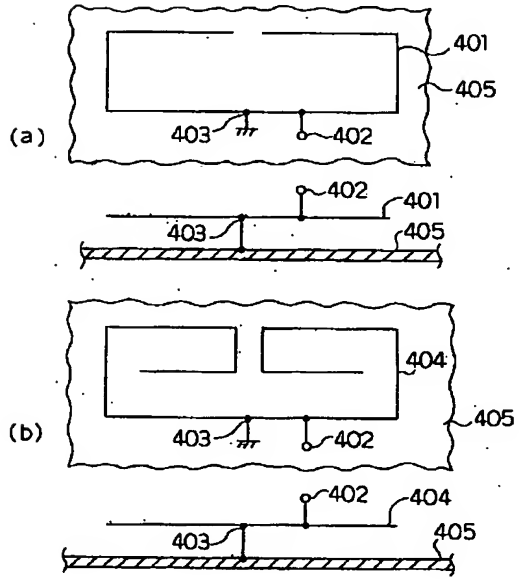
【図２】



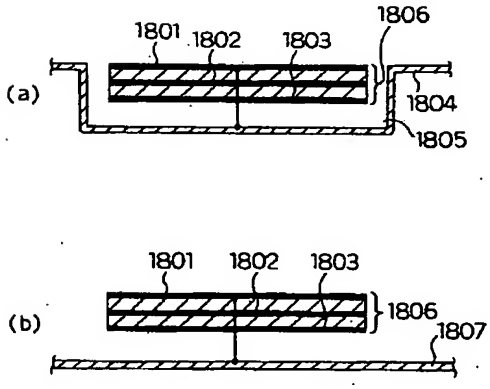
【図３】



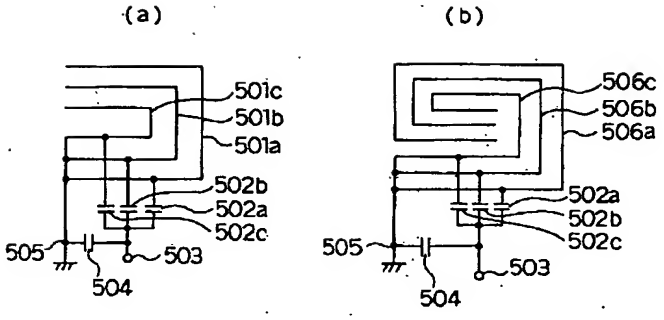
【図４】



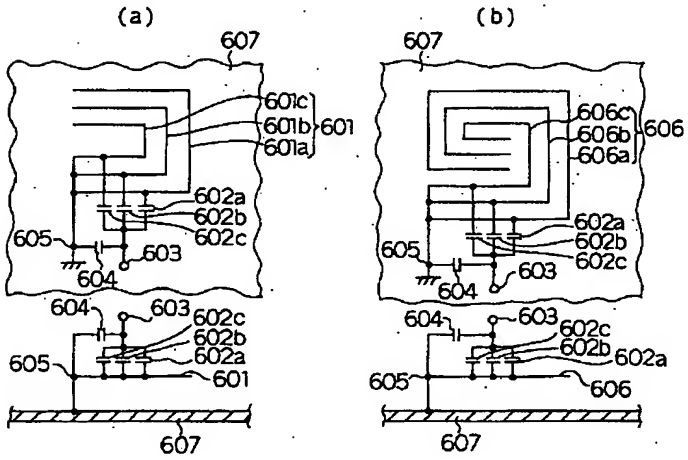
【図１８】



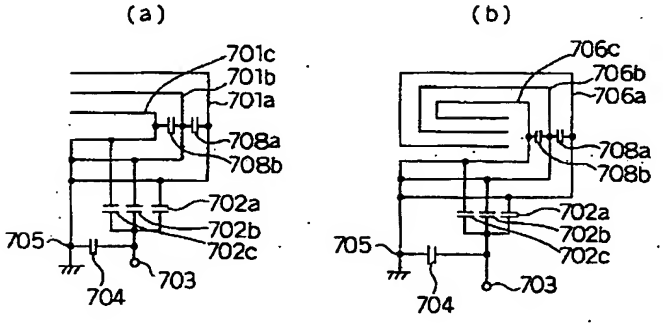
【図５】



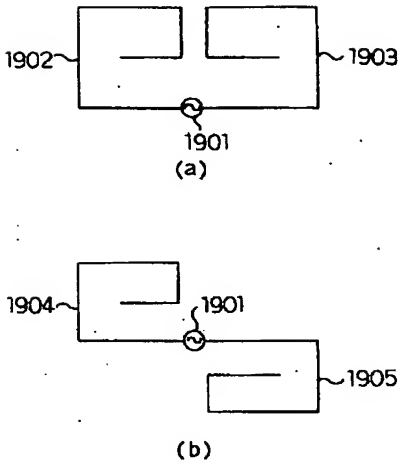
【図６】



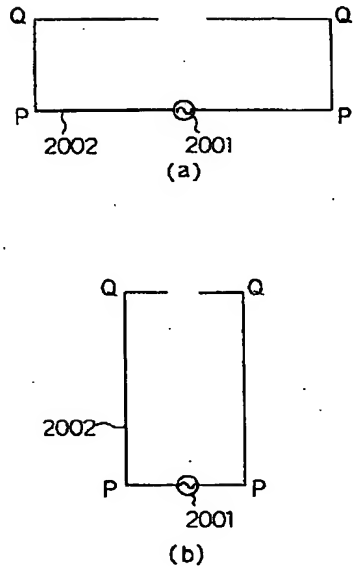
【図７】



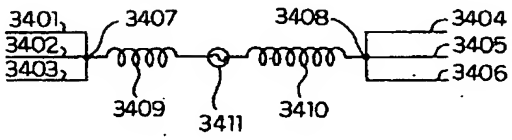
【図１９】



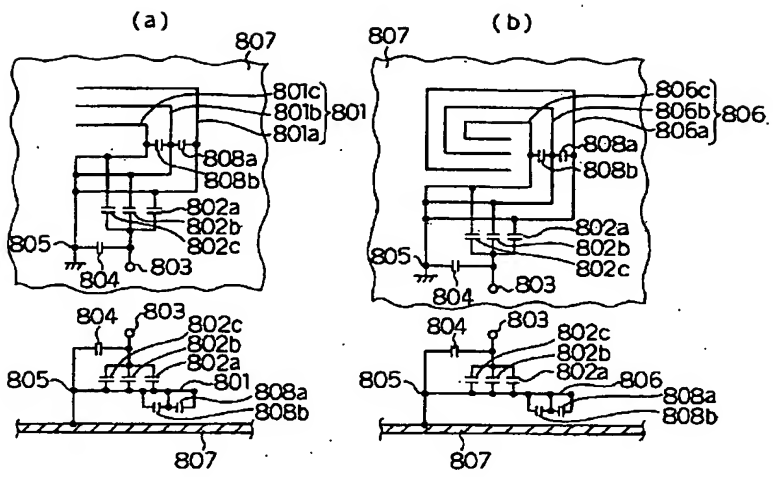
【図２０】



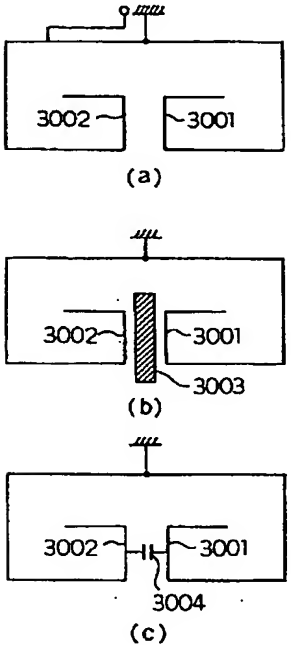
【図３４】



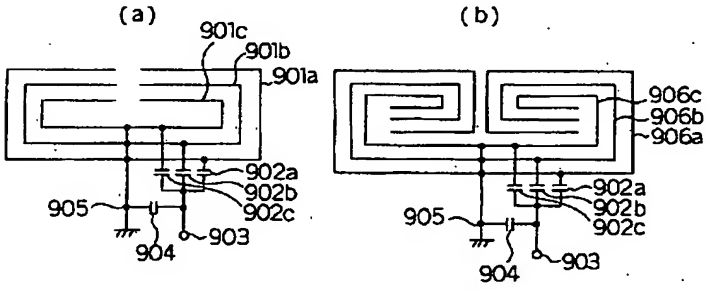
【図８】


(a)
807
801c
801b
801
801a
808a
808b
802a
802b
802c
805
804
803
804
803
802c
802b
802a
805
801
808a
808b
807
(b)
807
806c
806b
806
806a
808a
808b
802a
802b
802c
805
804
803
804
803
802c
802b
802a
806
805
808a
808b
807

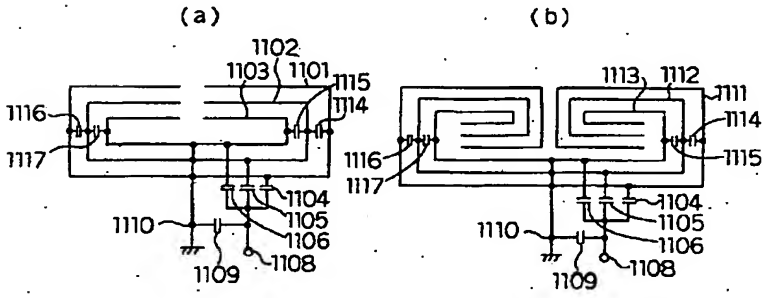
【図３０】


3002
3001
(a)
3002
3001
3003
(b)
3002
3001
3004
(c)

【図９】


(a)
901c
901b
901a
902a
902b
902c
905
904
903
(b)
906c
906b
906a
902a
902b
902c
905
904
903

【図１１】


(a)
1102
1103
1101
1115
1114
1116
1117
1104
1105
1110
1106
1109
1108
(b)
1113
1112
1111
1114
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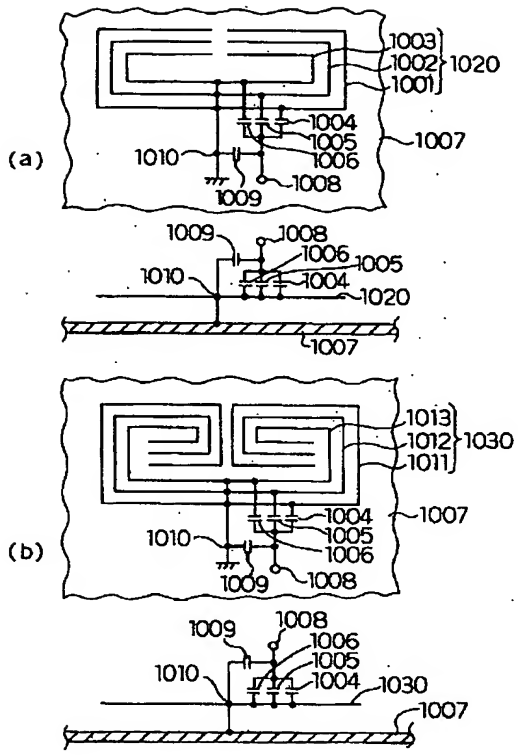
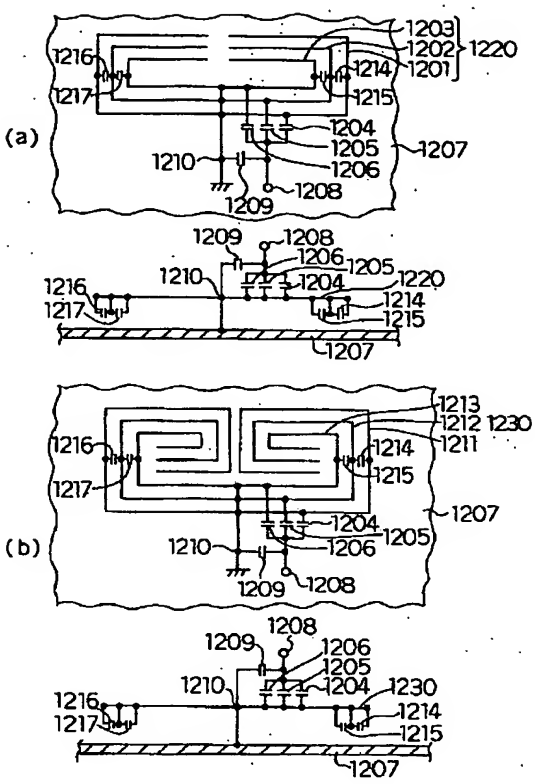
1115
1117
1104
1105
1110
1106
1109
1108

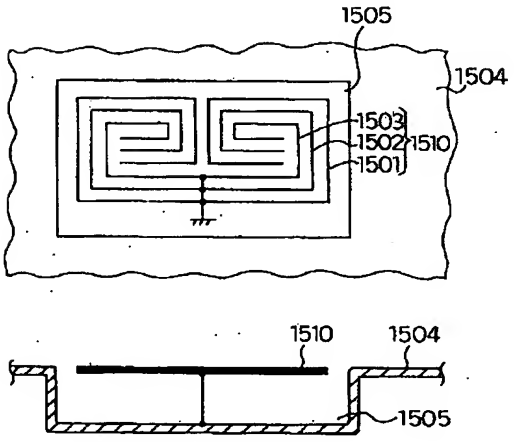
【図１０】



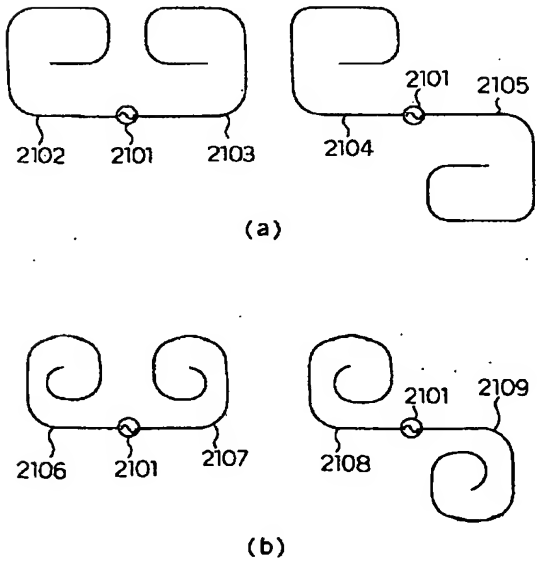
【図１２】



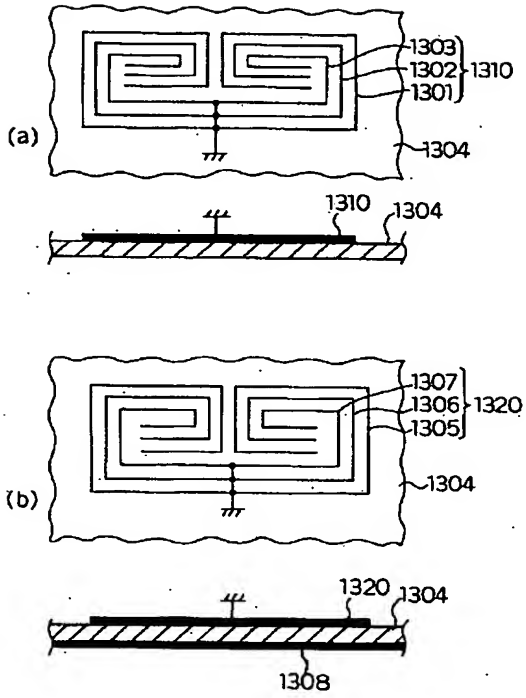
【図１５】



【図２１】



【図１３】



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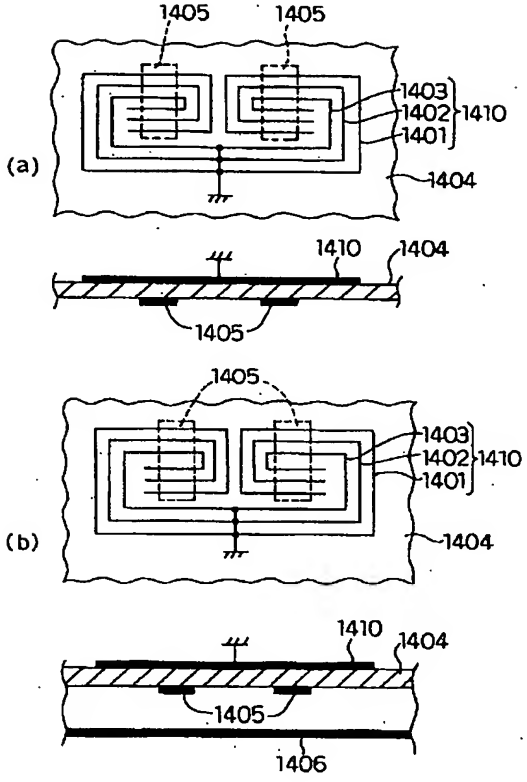

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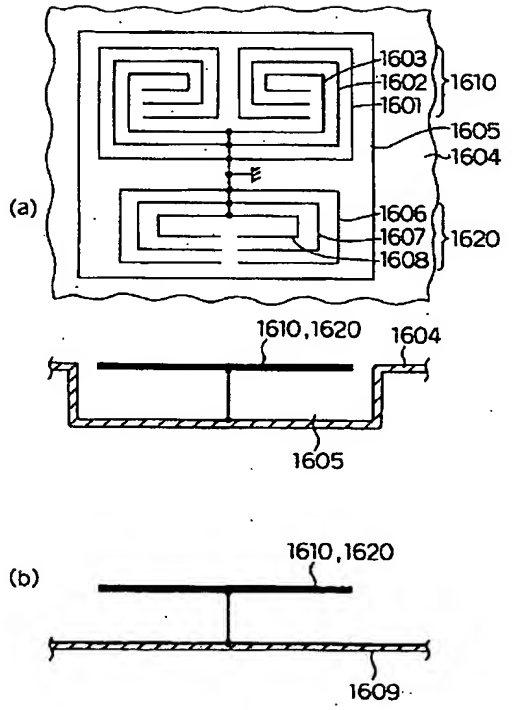

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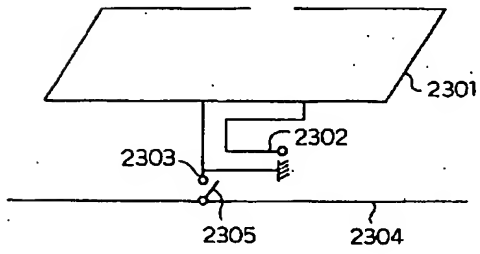

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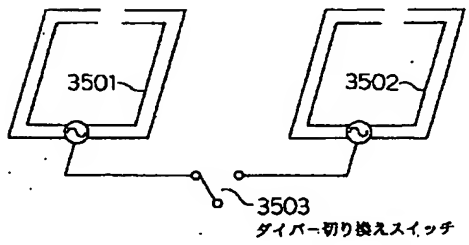

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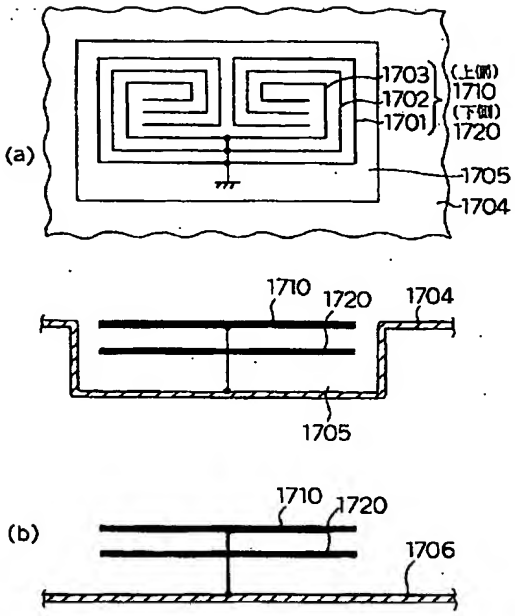

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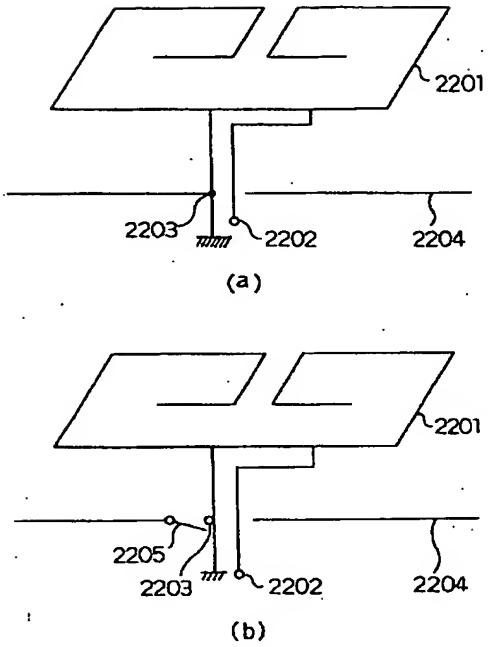

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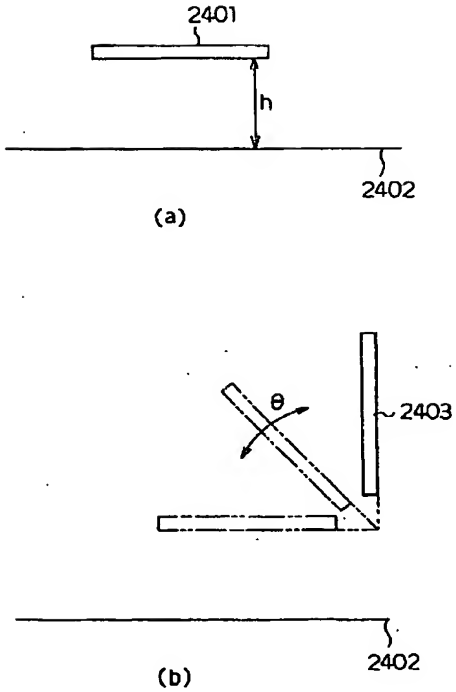

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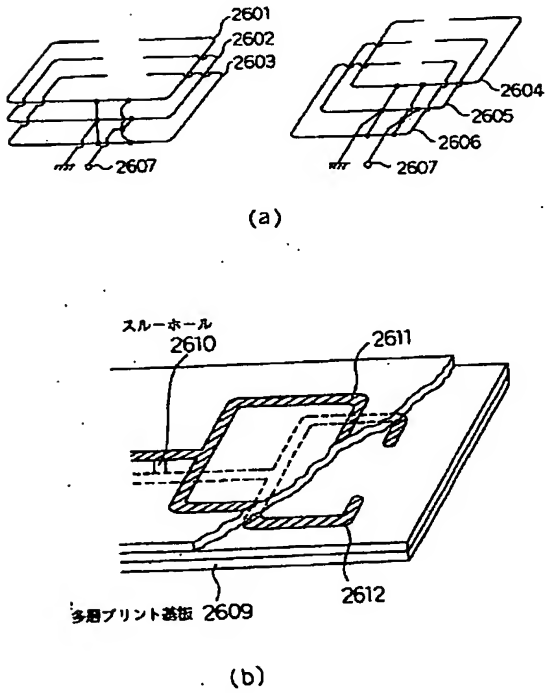

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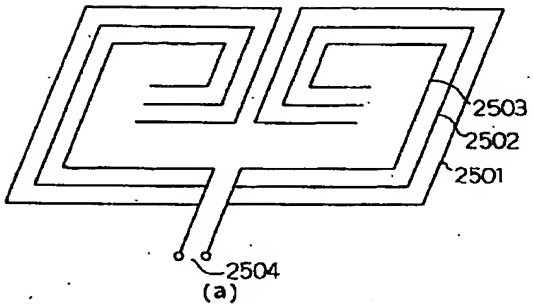

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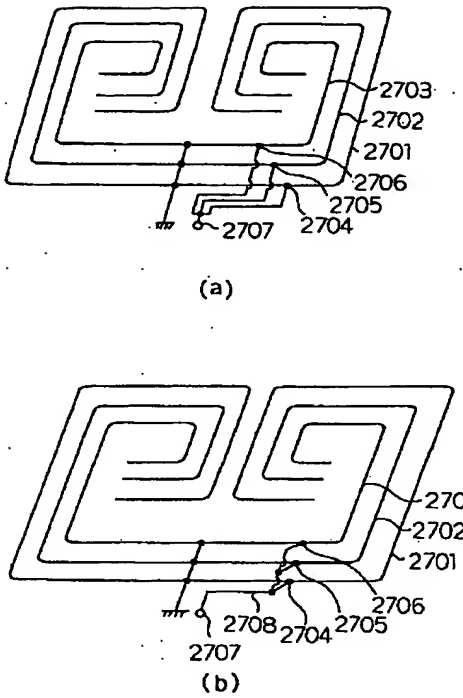

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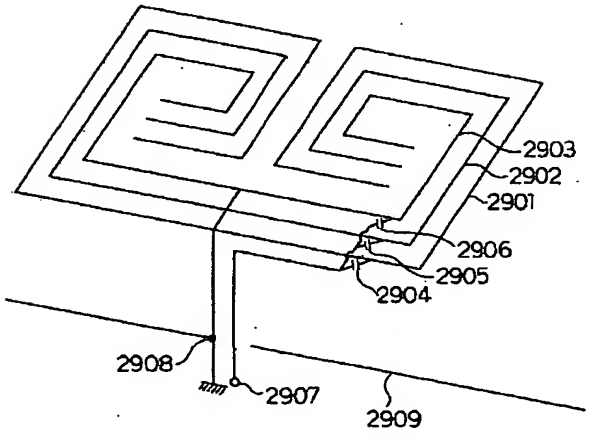

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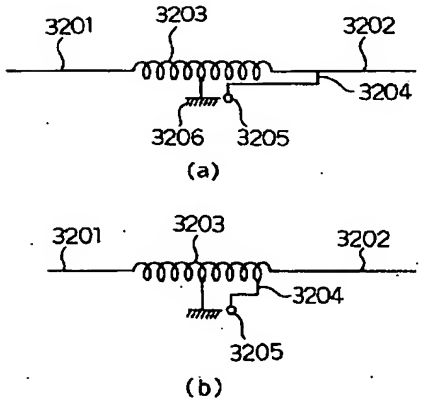

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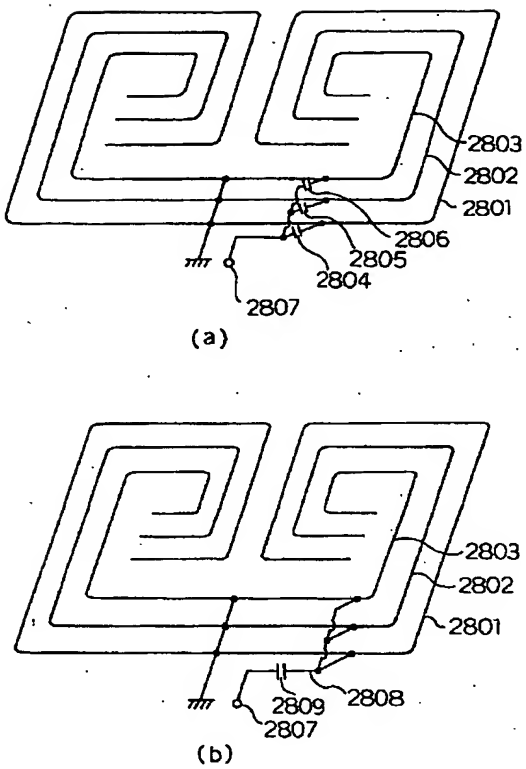

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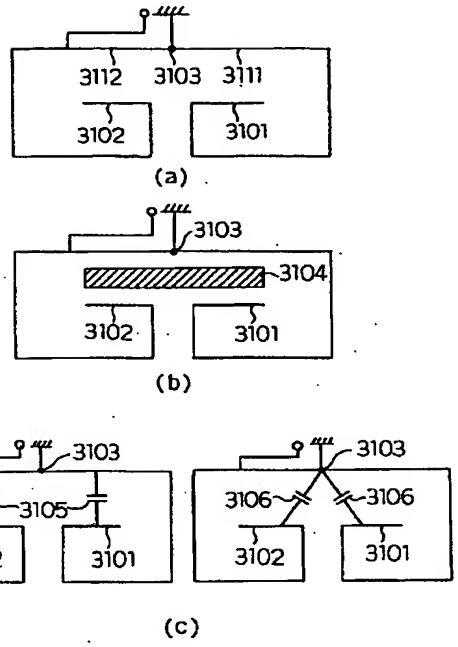

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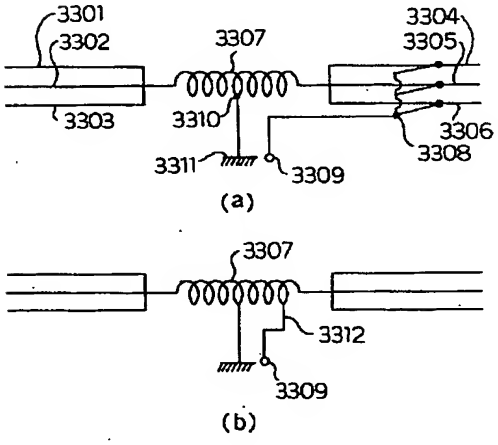

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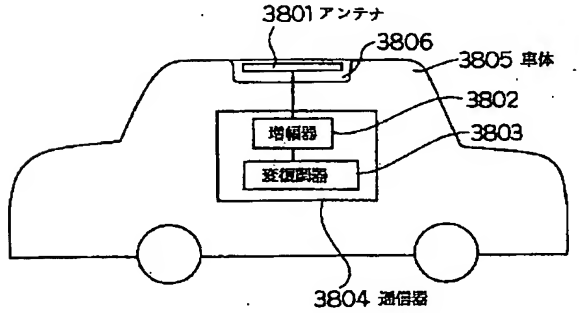

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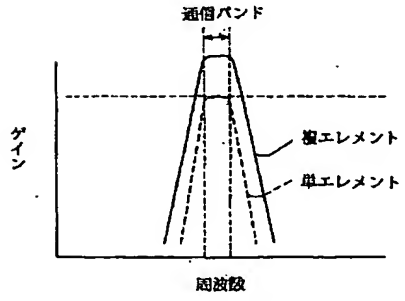

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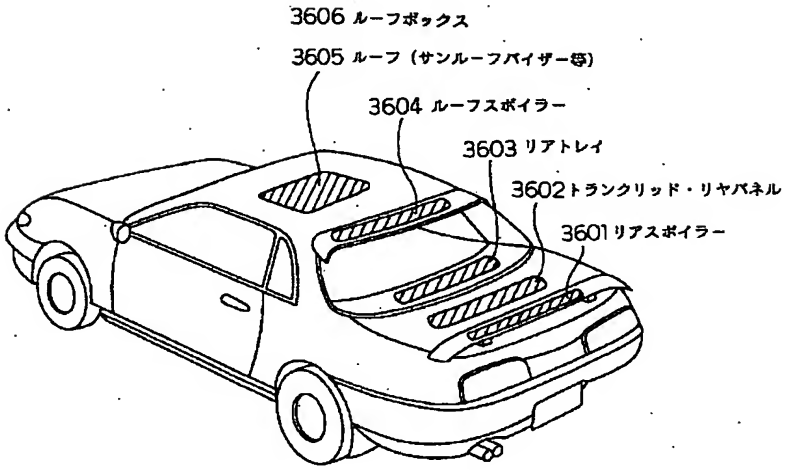

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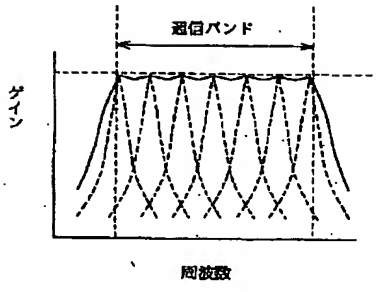

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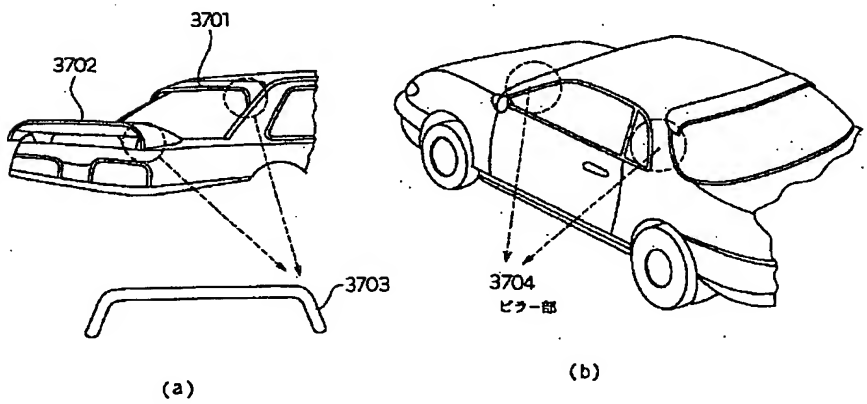

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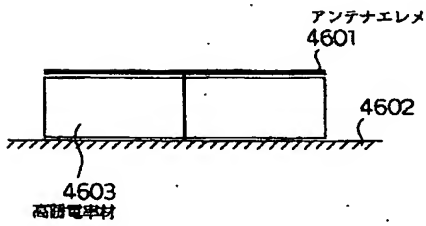

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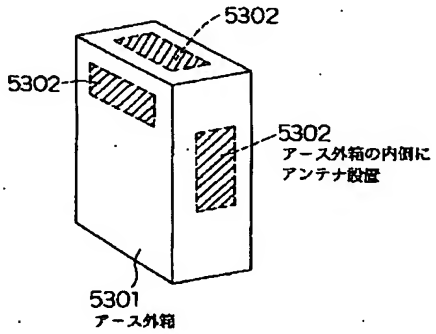

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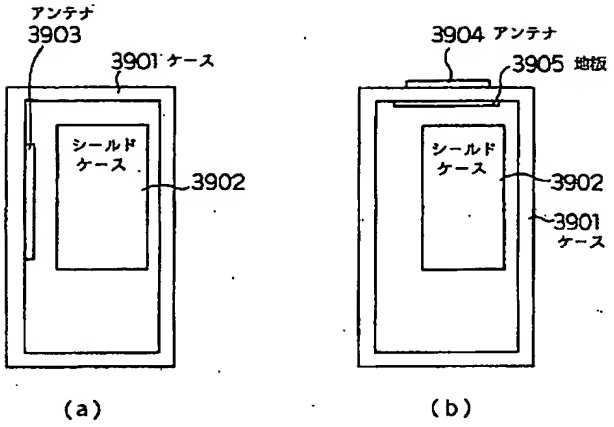

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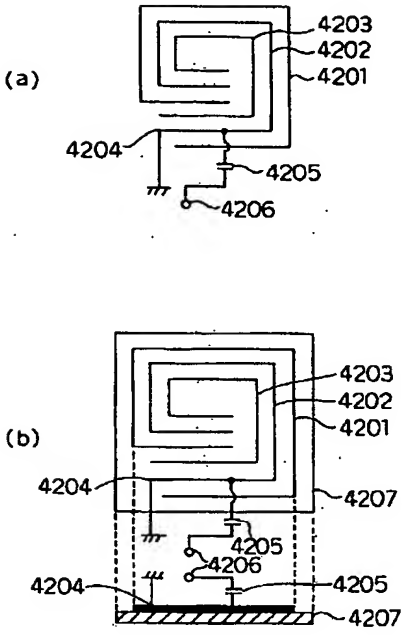

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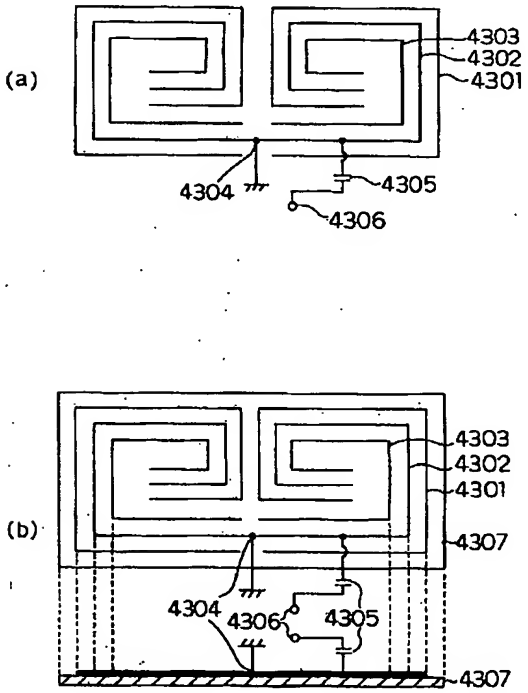

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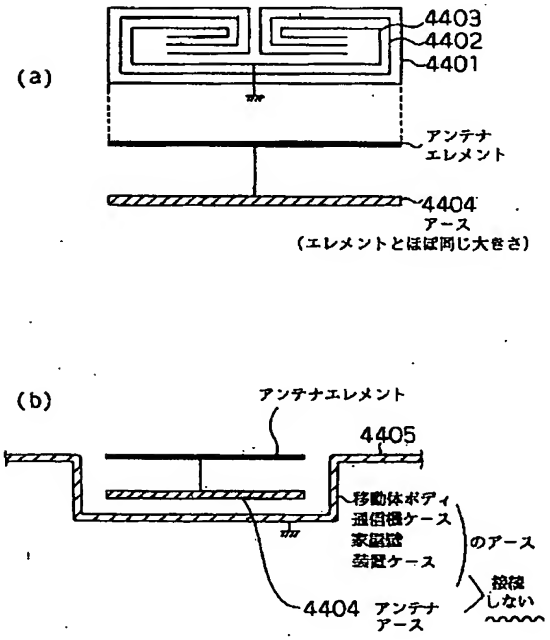

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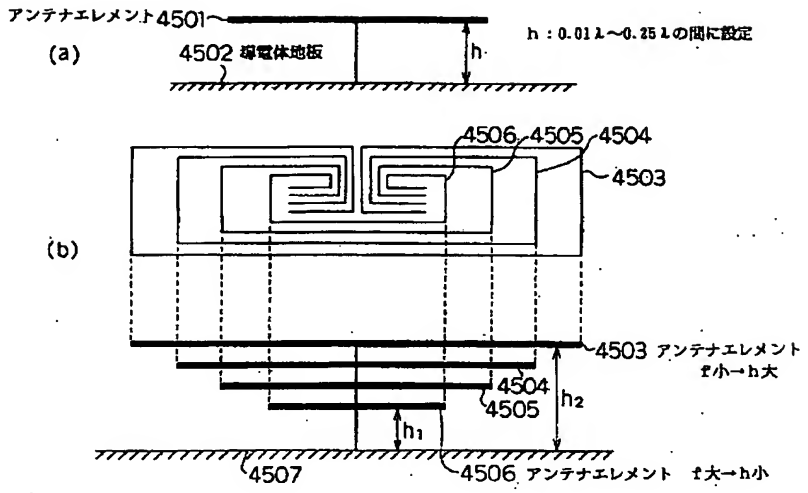
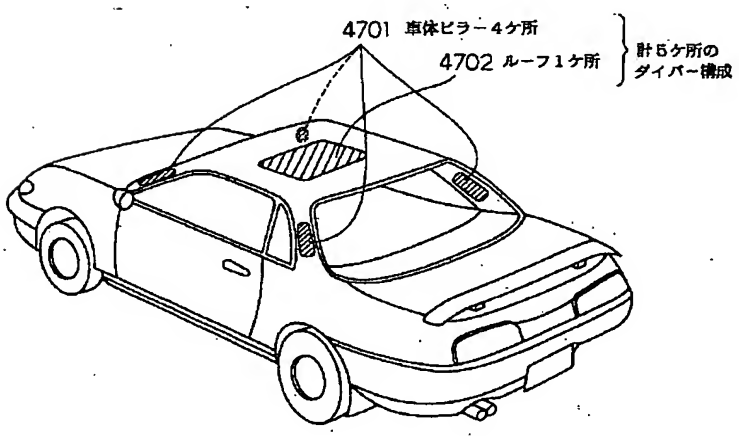
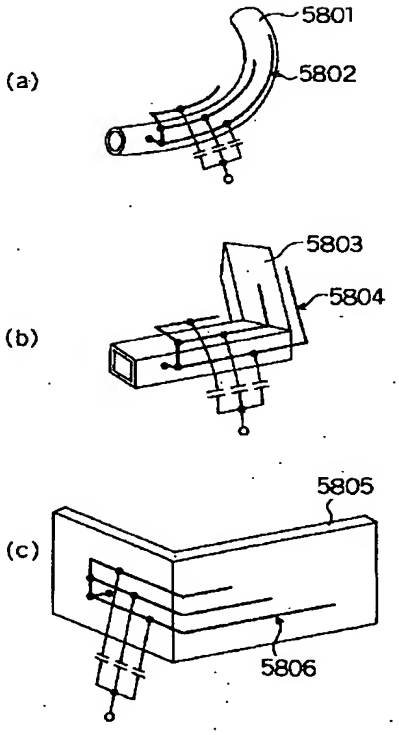

アンテナエレメント4501
(a)
4502 導電体地板
h
h：0.01λ～0.25λの間に設定
4506 4505 4504
4503
(b)
4503 アンテナエレメント
f小→h大
4504
4505
h2
h1
4507
4506 アンテナエレメント　f大→h小

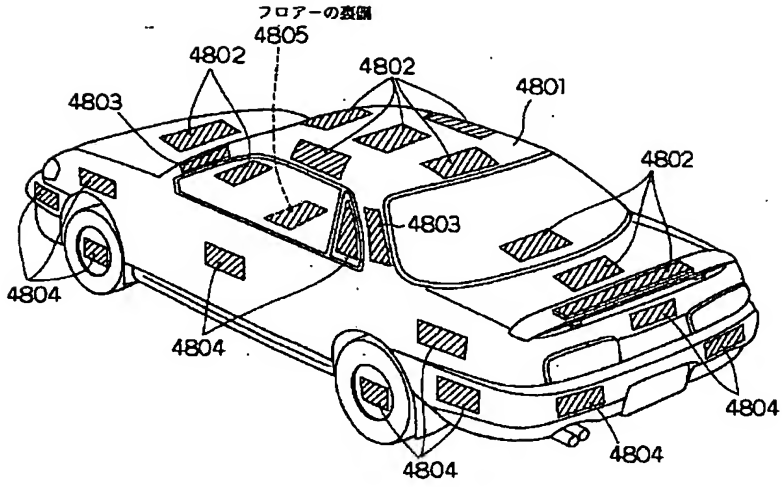
【図４７】


4701 車体ピラー４ケ所
4702 ルーフ１ケ所
計５ケ所の
ダイバー構成

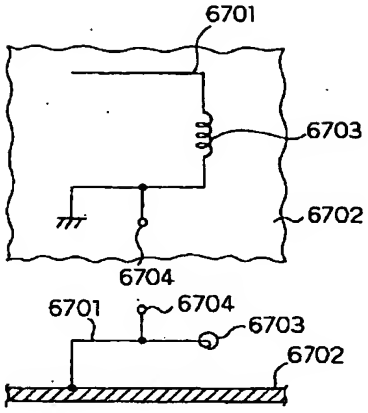
【図５８】


(a)
5801
5802
(b)
5803
5804
(c)
5805
5806

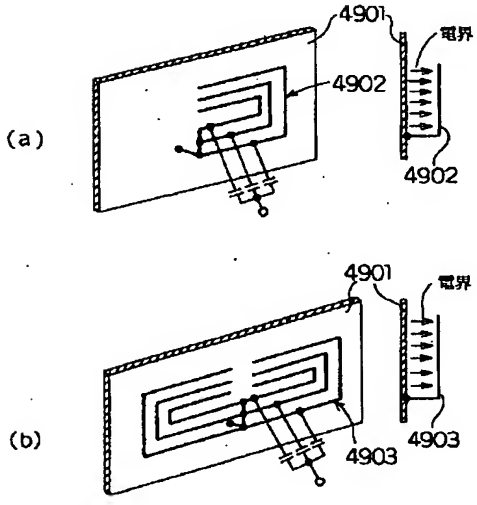
【図４８】



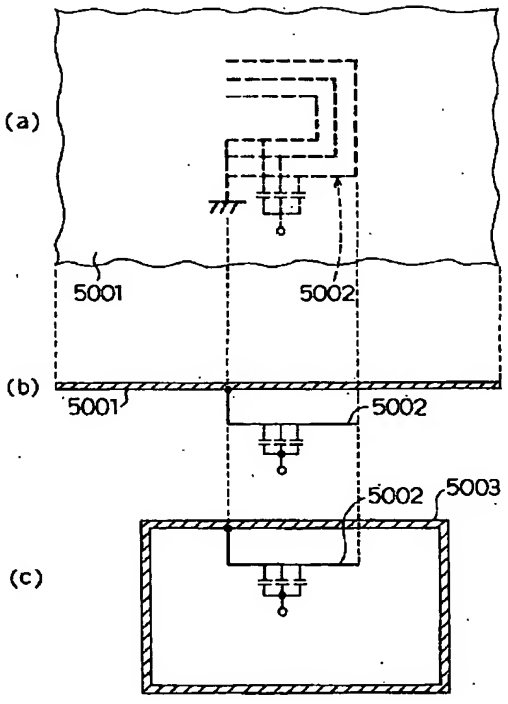
【図６７】



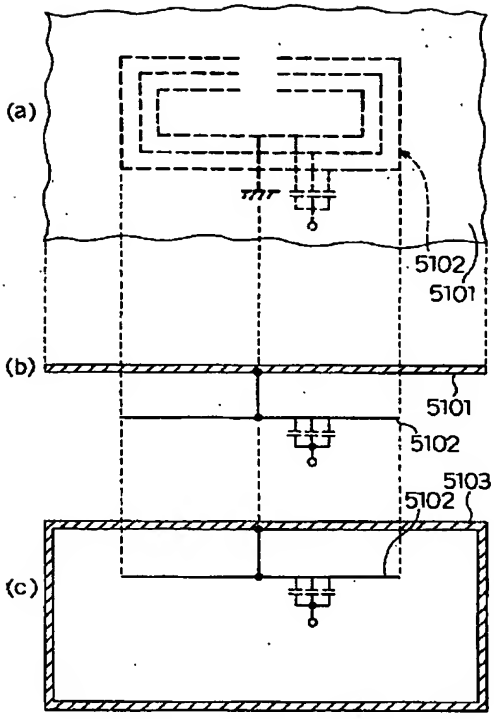
【図４９】



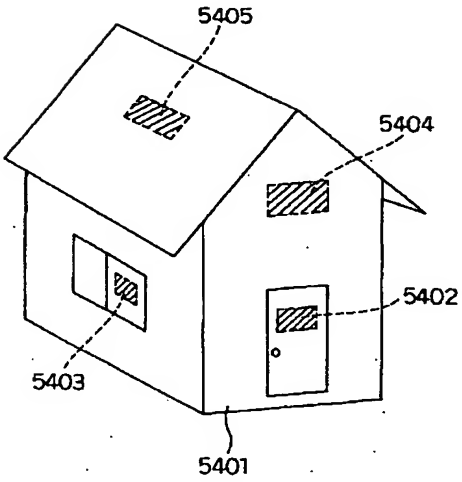
【図５０】



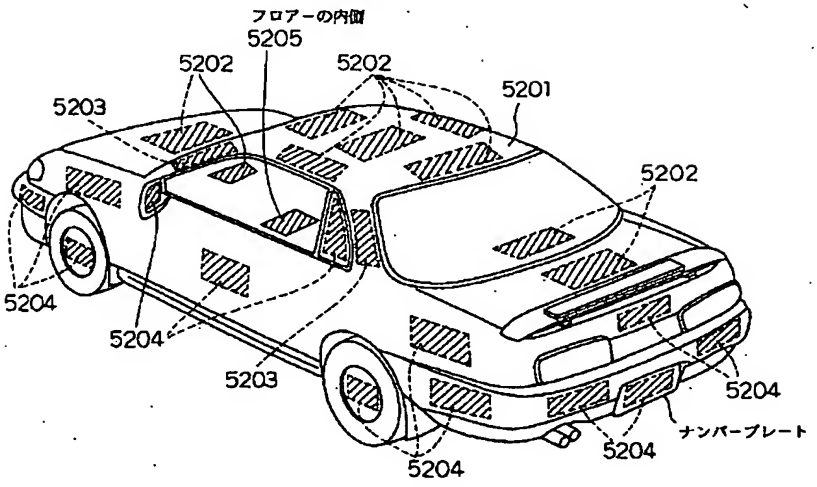
【図５１】


(a)
5102
5101
(b)
5101
5102
5103
5102
(c)

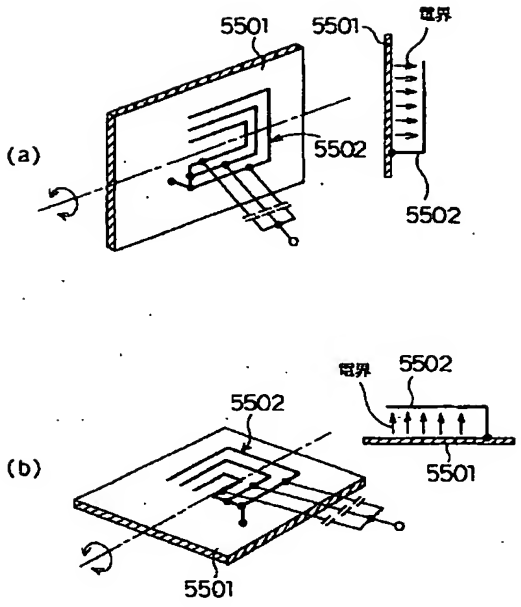
【図５４】


5405
5404
5402
5403
5401

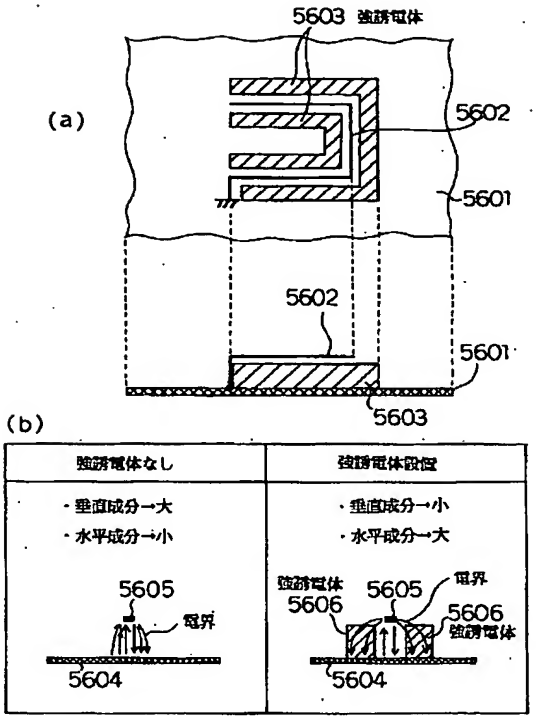
【図５２】


フロアーの内側
5205
5202
5202
5201
5203
5202
5204
5204
5203
5204
5204
ナンバープレート
5204

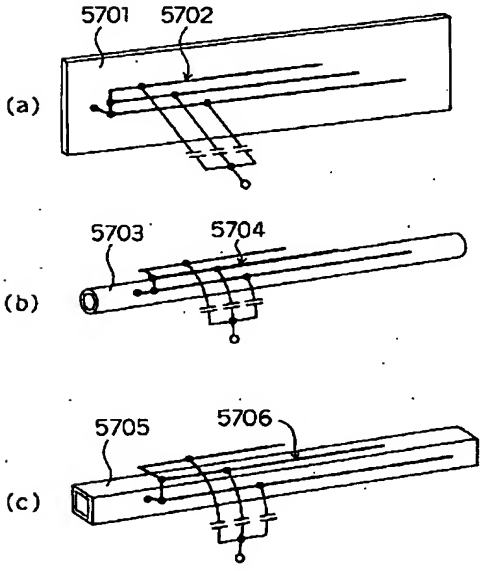
【図５５】



【図５６】



【図５７】



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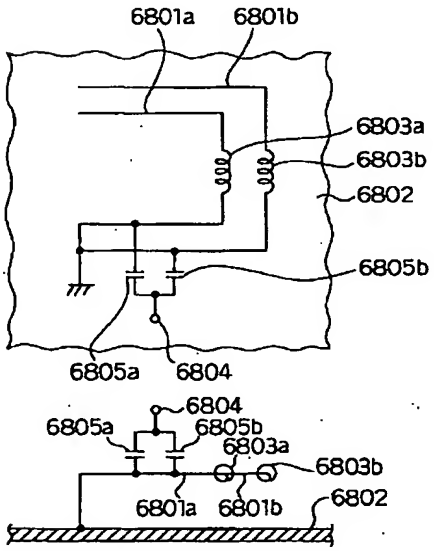
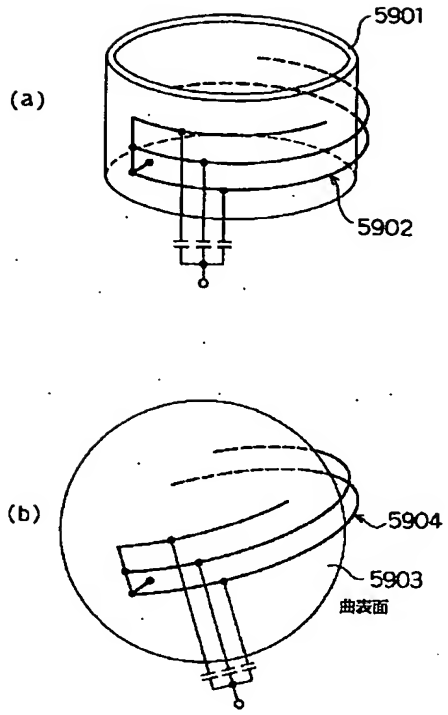
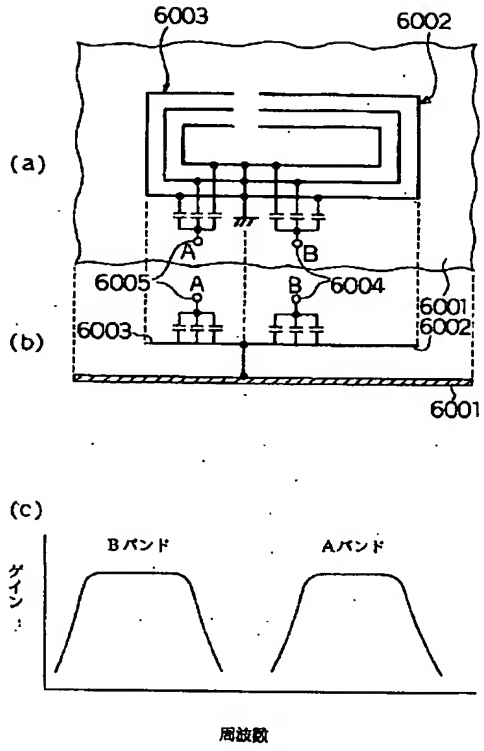


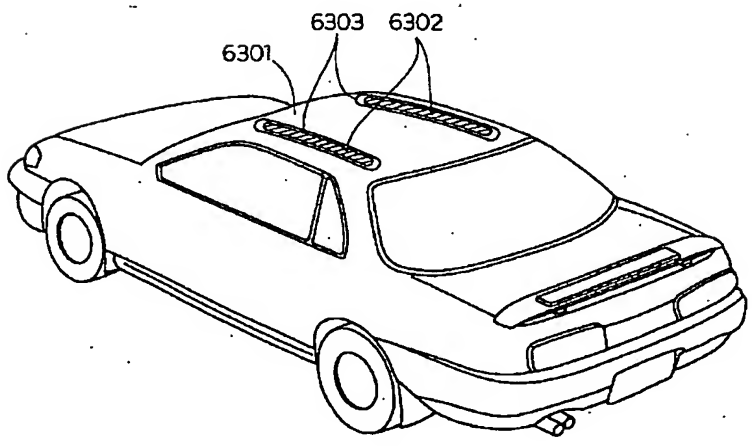
【図５９】



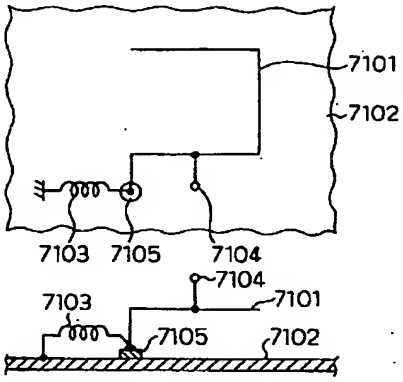
【図６０】



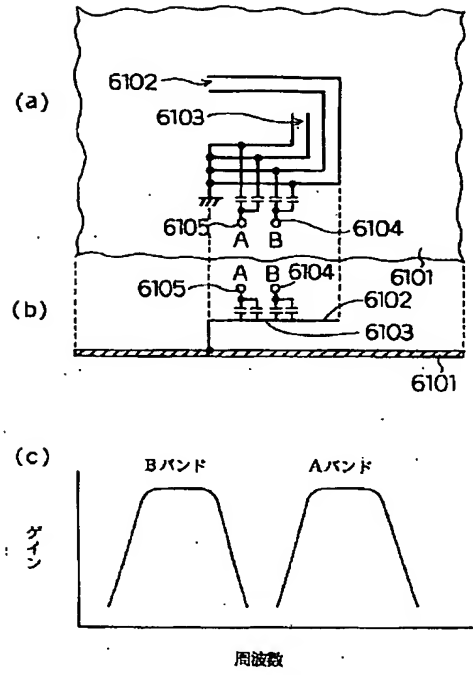
【図６３】



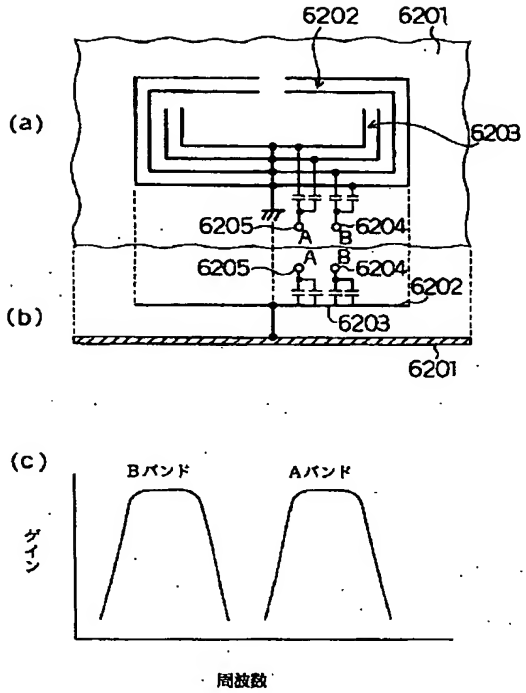
【図７１】



【図６１】



【図６２】



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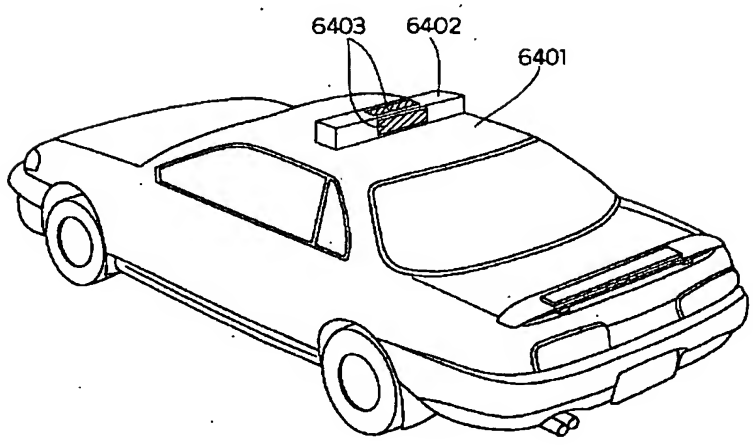

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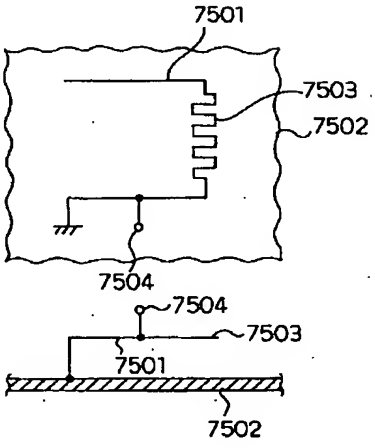

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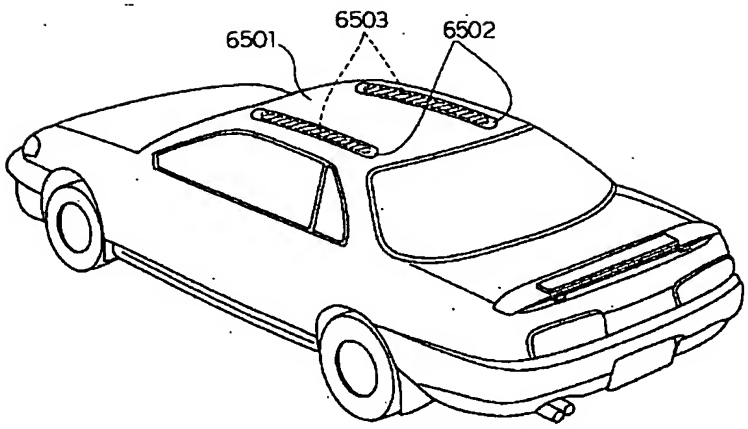

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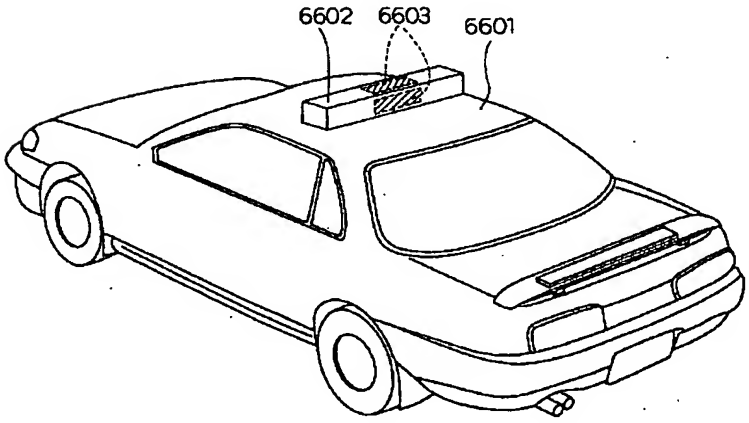
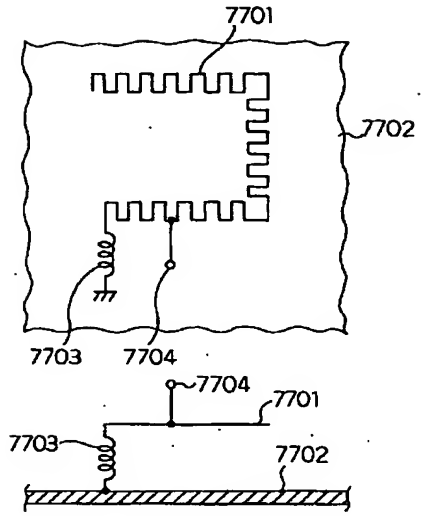
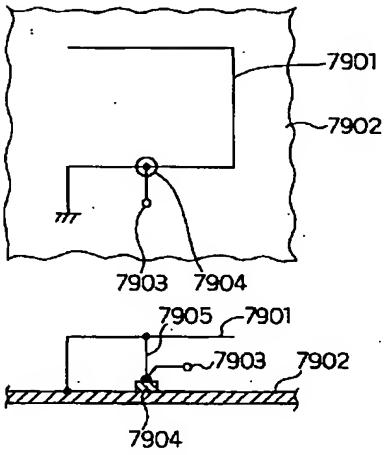


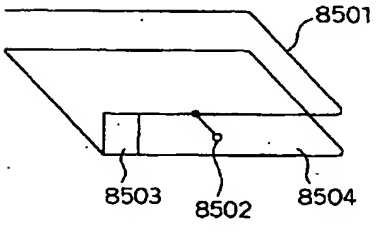
【図７７】



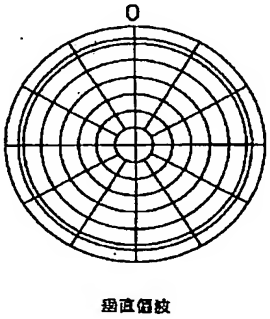
【図７９】



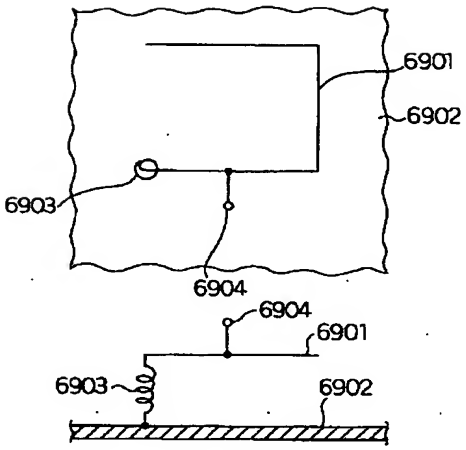
【図８５】



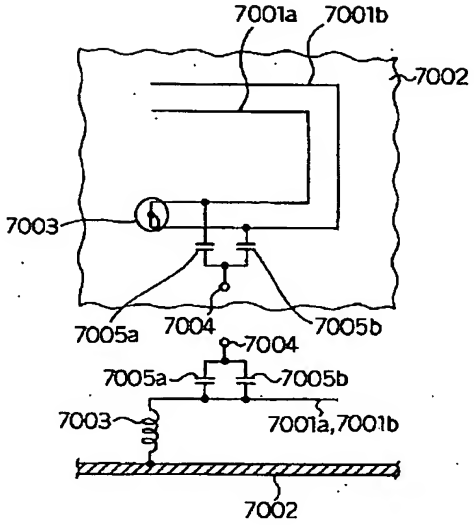
【図８７】



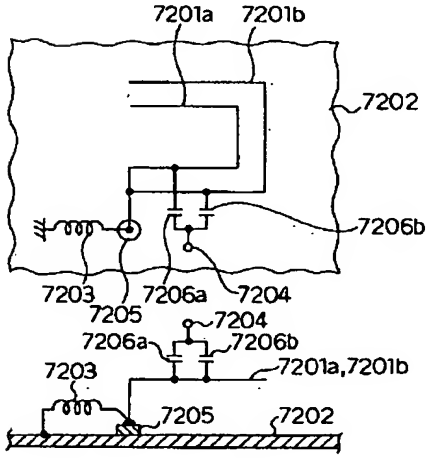
【図６９】



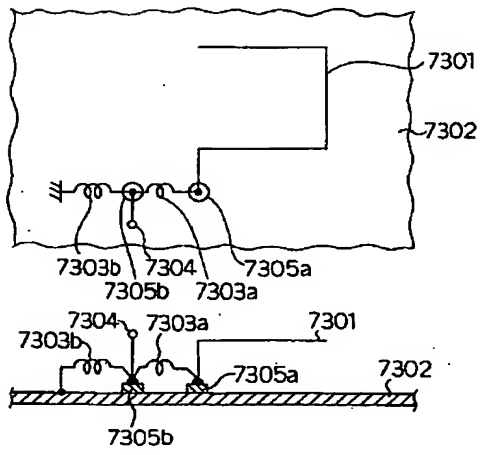
【図７０】



【図７２】



【図７３】



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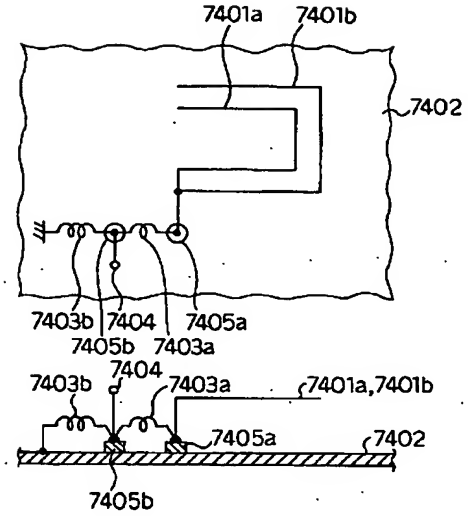

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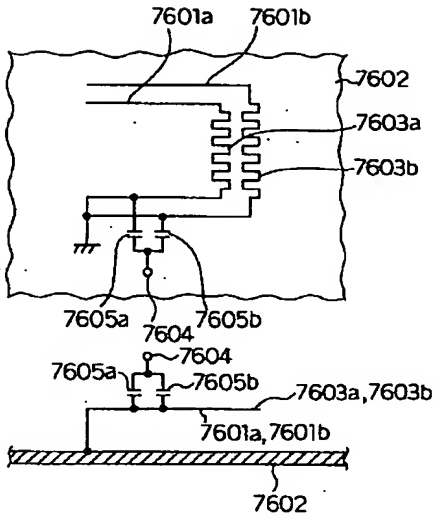
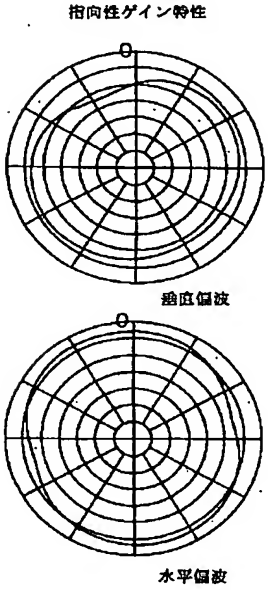
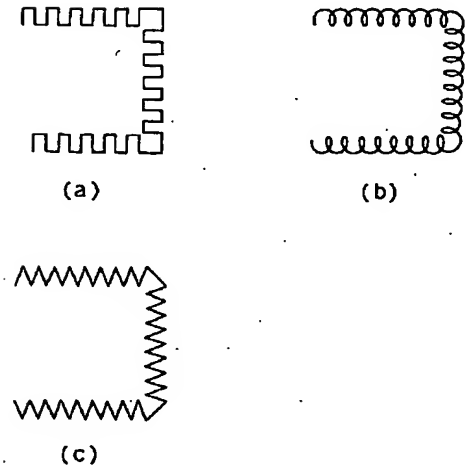


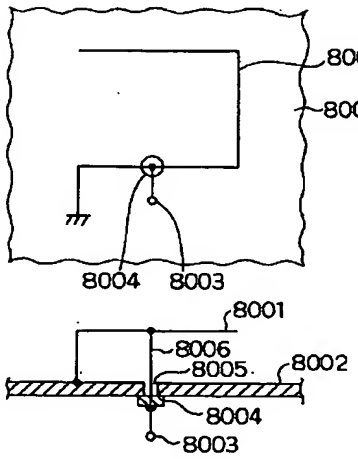
【図９５】



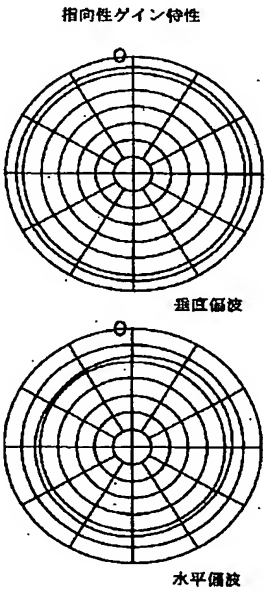
【図７８】



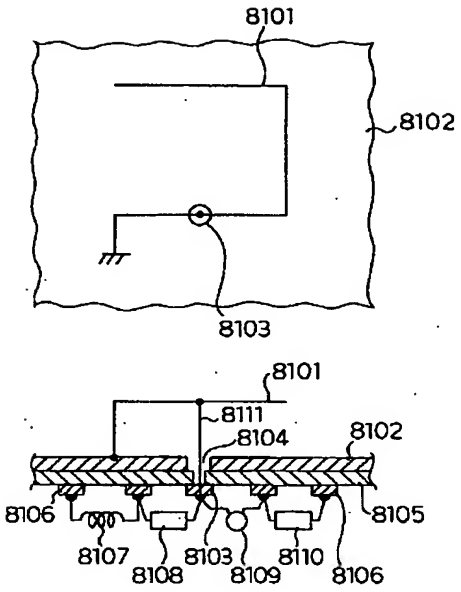
【図８０】



【図９６】



【図８１】



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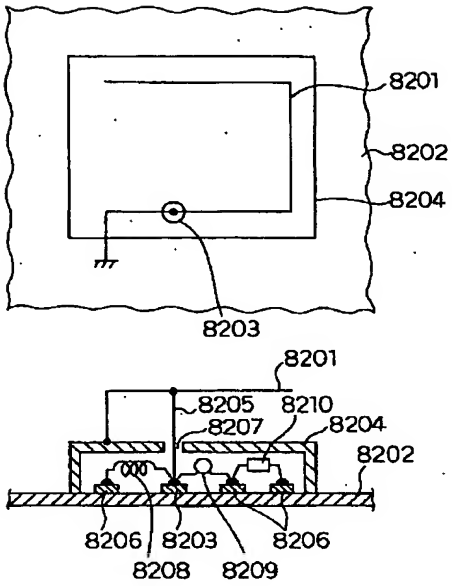
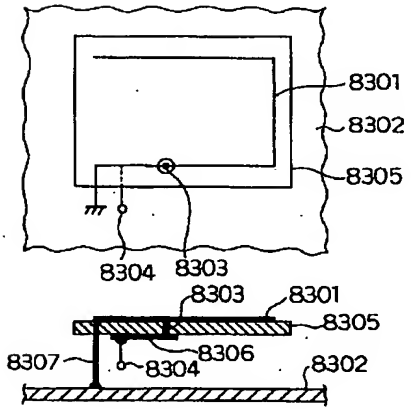


【図８３】



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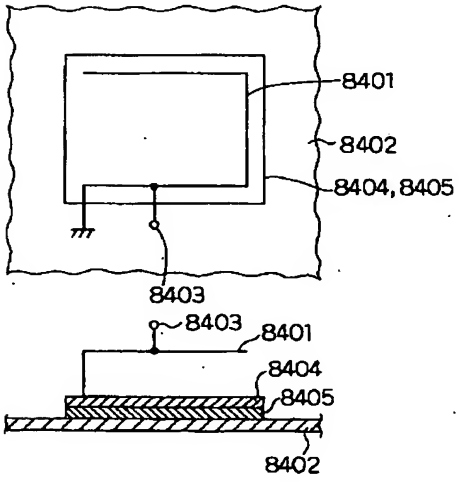

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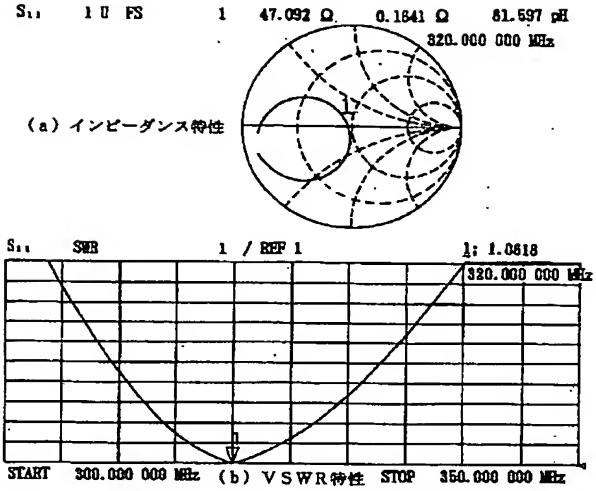

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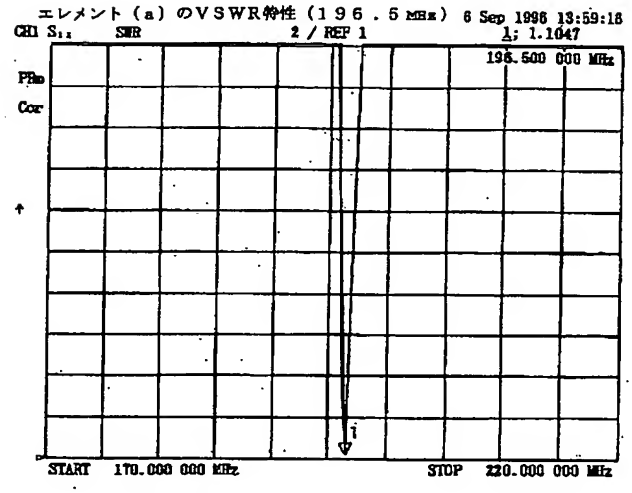
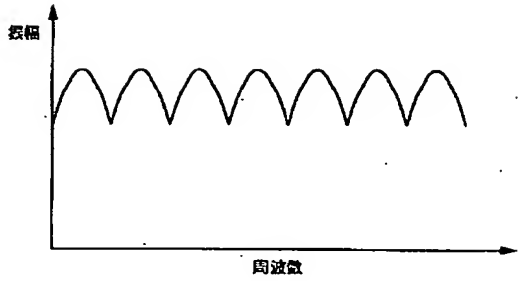


【図１０３】



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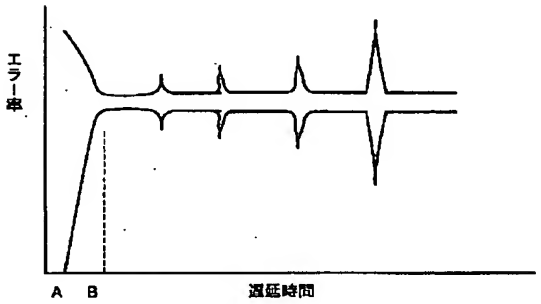
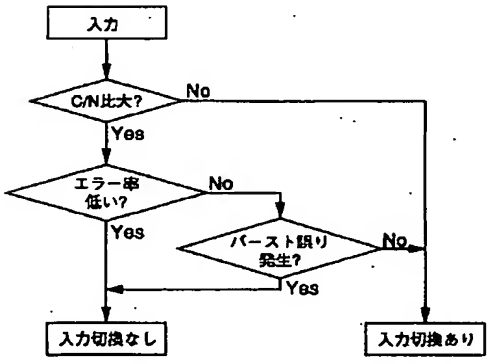
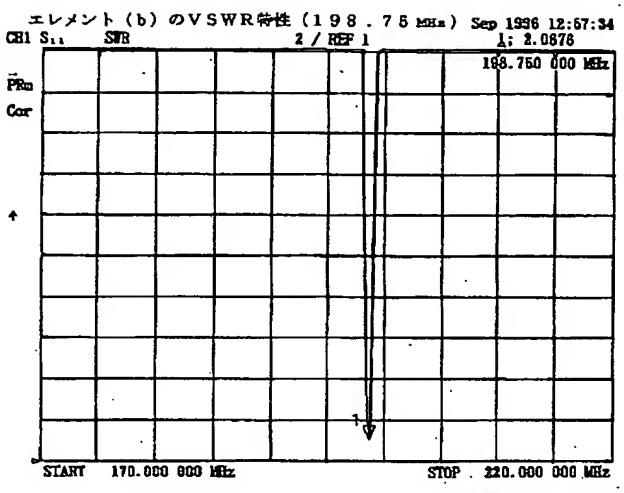


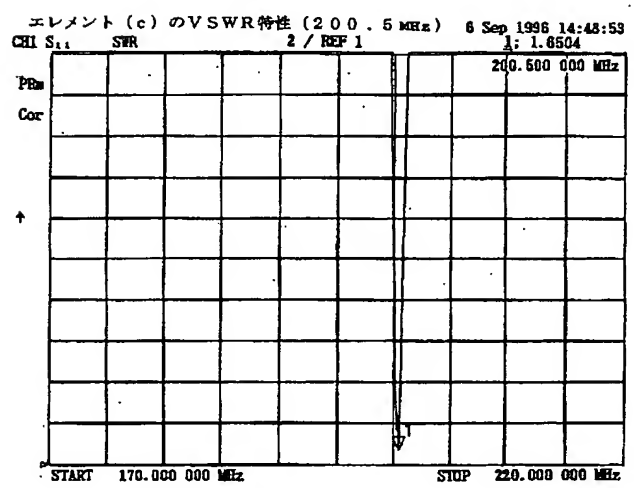
【図１０６】



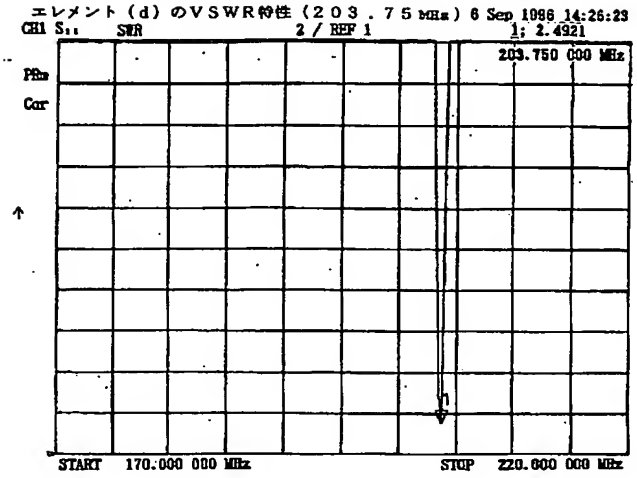
【図８９】


エレメント（b）のVSWR特性（１９８．７５ MHz）
Sep 1996 12:57:34
CH1 S11 SWR
2 / REF 1
1: 2.0878
198.750 000 MHz
PRm
Cor
START 170.000 000 MHz
STOP 220.000 000 MHz

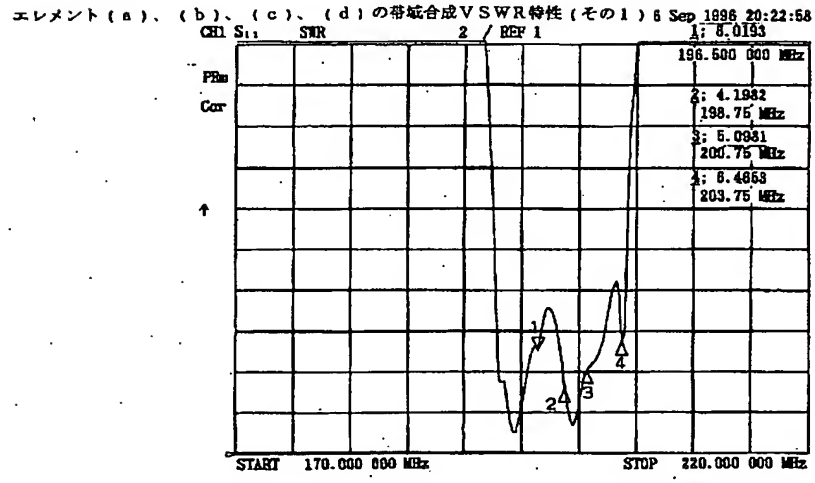
【図９０】


エレメント（c）のVSWR特性（２００．５ MHz）
6 Sep 1996 14:48:53
CH1 S11 SWR
2 / REF 1
1: 1.6504
200.500 000 MHz
PRm
Cor
START 170.000 000 MHz
STOP 220.000 000 MHz

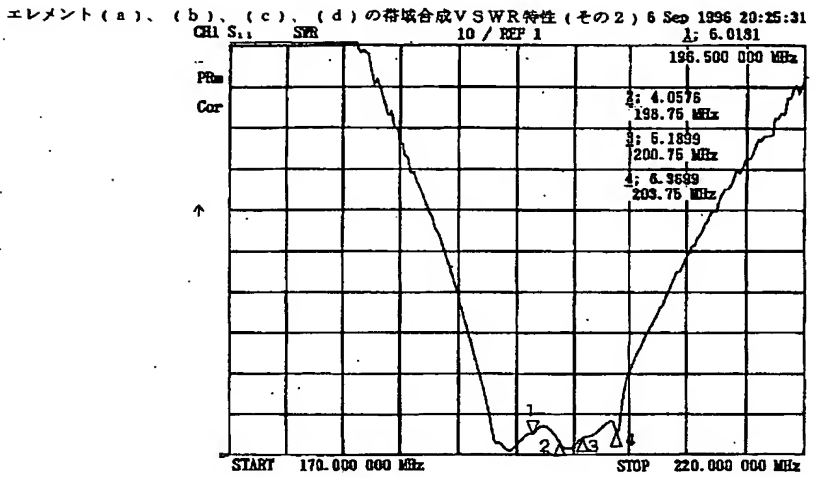
【図９１】


エレメント（d）のＶＳＷＲ特性（２０３．７５MHz）6 Sep 1996 14:26:23
CH1 S11 SWR
2 / REF 1
1: 2.4921
203.750 000 MHz
PRm
Cor
START 170.000 000 MHz
STOP 220.000 000 MHz

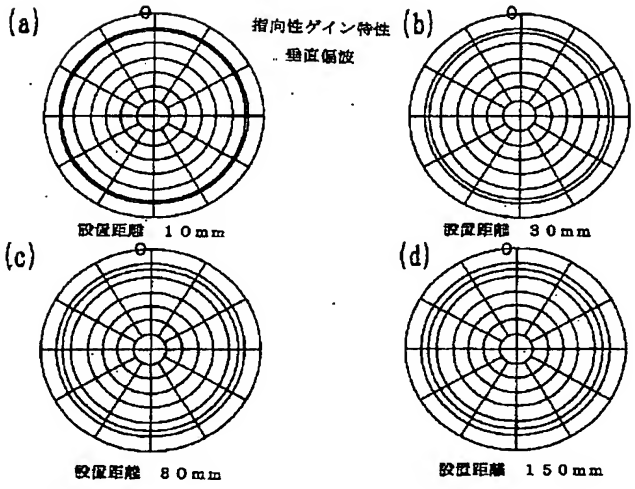
【図９２】


エレメント（a）、（b）、（c）、（d）の帯域合成ＶＳＷＲ特性（その１）6 Sep 1996 20:22:58
CH1 S11 SWR
2 / REF 1
1: 5.0193
196.500 000 MHz
PRm
Cor
2: 4.1932
198.75 MHz
3: 5.0931
200.75 MHz
4: 6.4853
203.75 MHz
START 170.000 000 MHz
STOP 220.000 000 MHz

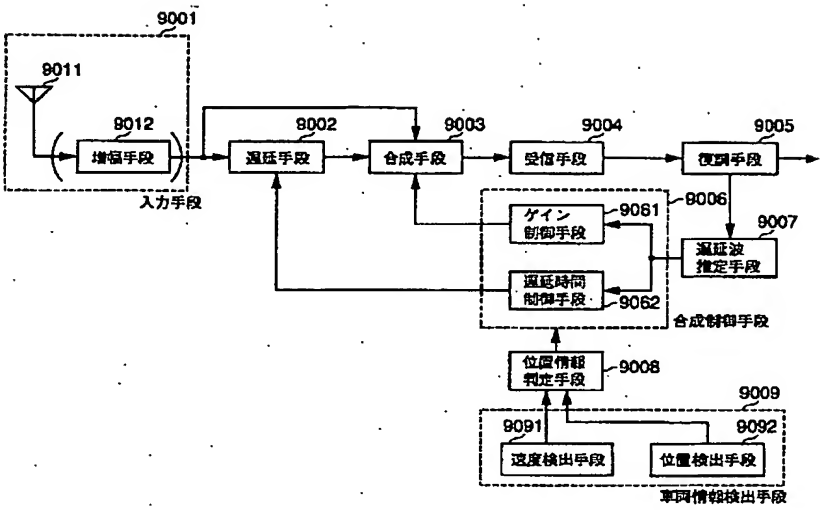
【図９３】


エレメント（ａ）、（ｂ）、（ｃ）、（ｄ）の帯域合成ＶＳＷＲ特性（その２）6 Sep 1996 20:25:31
CH1 S11 SWR
10 / REF 1
1: 6.0181
196.500 000 MHz
PRm
Cor
2: 4.0575
198.75 MHz
3: 5.1899
200.75 MHz
4: 6.3699
203.75 MHz
START 170.000 000 MHz
STOP 220.000 000 MHz

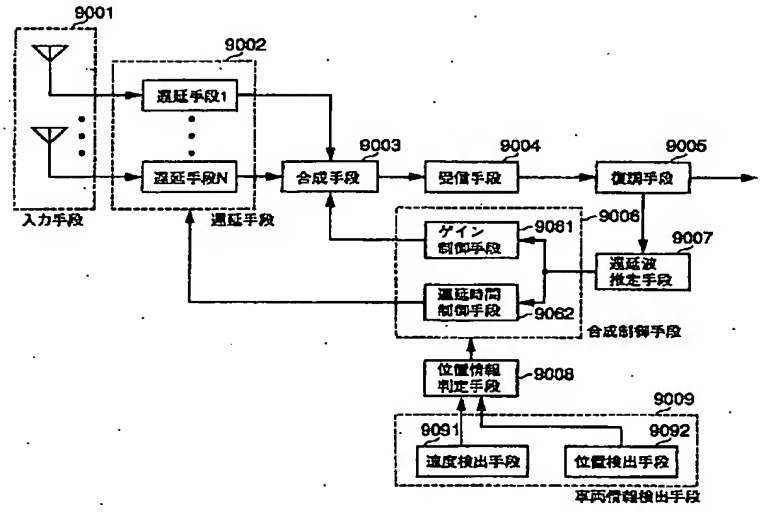
【図９４】


(a)
指向性ゲイン特性
垂直偏波
(b)
設置距離 １０ｍｍ
設置距離 ３０ｍｍ
(c)
(d)
設置距離 ８０ｍｍ
設置距離 １５０ｍｍ

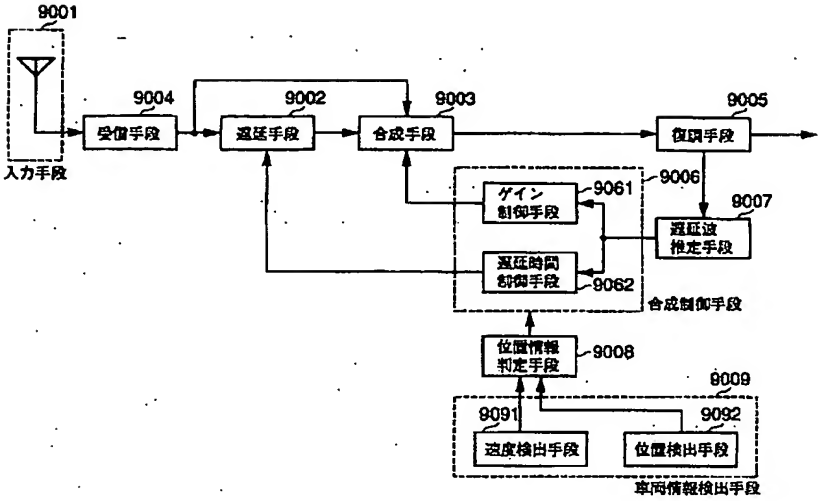
【図９７】


9001
9011
9012
増幅手段
入力手段
9002
遅延手段
9003
合成手段
9004
受信手段
9005
復調手段
9006
ゲイン制御手段
9061
遅延時間制御手段
9062
合成制御手段
9007
遅延波推定手段
9008
位置情報判定手段
9009
9091
速度検出手段
9092
位置検出手段
車両情報検出手段

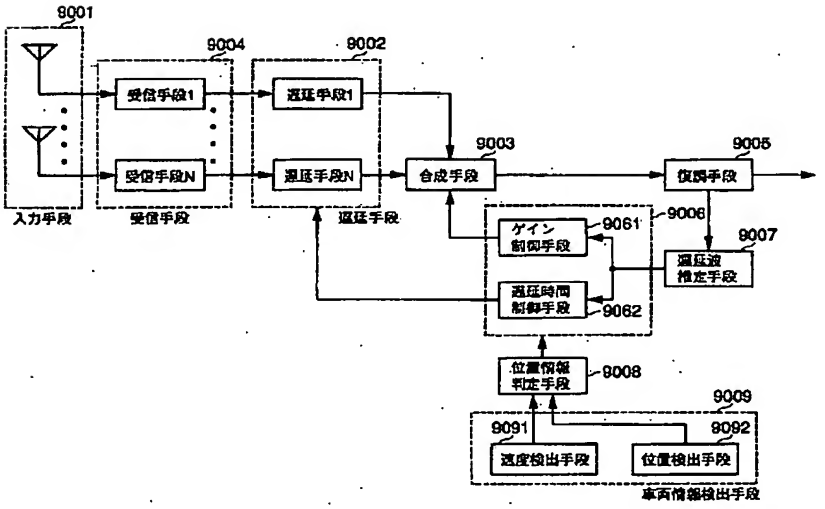
【図９８】


9001
9002
遅延手段1
遅延手段N
入力手段
遅延手段
9003
合成手段
9004
受信手段
9005
復調手段
9006
ゲイン制御手段
9061
遅延時間制御手段
9062
合成制御手段
9007
遅延波推定手段
9008
位置情報判定手段
9009
9091
速度検出手段
9092
位置検出手段
車両情報検出手段

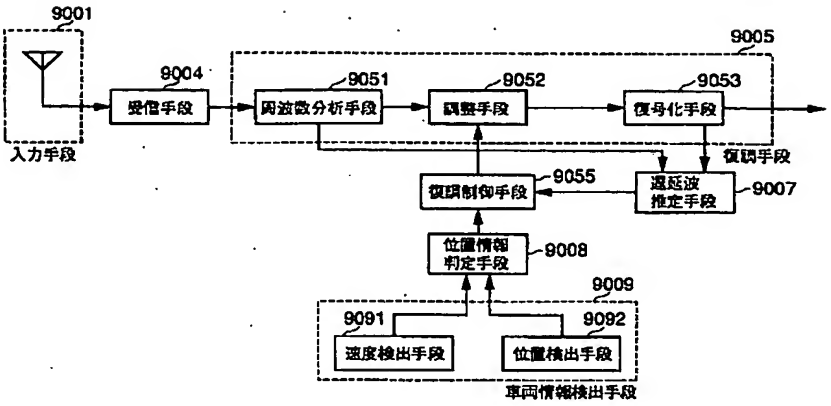
【図９９】


9001
入力手段
9004
受信手段
9002
遅延手段
9003
合成手段
9005
復調手段
9006
9061
ゲイン制御手段
9007
遅延波推定手段
遅延時間制御手段
9062
合成制御手段
位置情報判定手段
9008
9009
9091
速度検出手段
9092
位置検出手段
車両情報検出手段

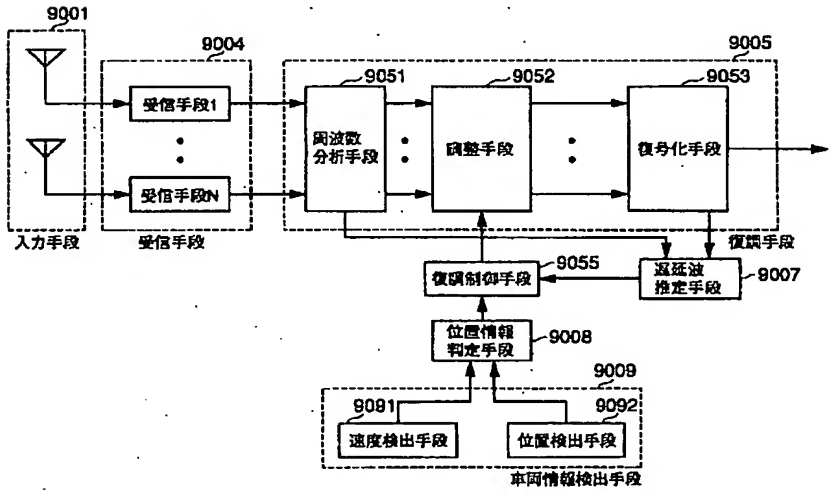
【図１００】


9001
入力手段
9004
受信手段1
受信手段N
受信手段
9002
遅延手段1
遅延手段N
遅延手段
9003
合成手段
9005
復調手段
9006
9061
ゲイン制御手段
9007
遅延波推定手段
遅延時間制御手段
9062
位置情報判定手段
9008
9009
9091
速度検出手段
9092
位置検出手段
車両情報検出手段

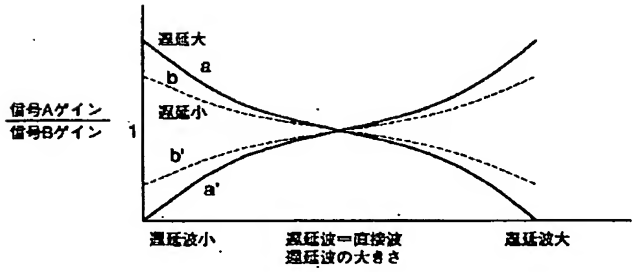
【図１０１】



【図１０２】



【図１０４】



フロントページの続き

(51)Int.Cl.'	識別記号	F I		テーマコード（参考）
Ｈ０４Ｊ　11/00		Ｈ０４Ｊ　11/00	Ｚ	
Ｈ０４Ｎ　5/44		Ｈ０４Ｎ　5/44	Ｚ	